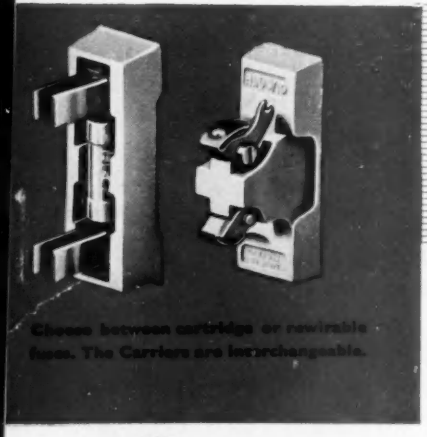
ELECTRICAL TIMES

THURSDAY
5 JULY
1951
NINEPENCE

NEW
right through

FOR SINGLE POLE AND NEUTRAL DUTY



Choose between cartridge or rewirable fuses. The Carriers are interchangeable.

MEM

Switch, fuse and motor control gear, electric fires and localised lighting equipment.

Send for the new Switchcraft catalogue (List No. 311) and full details of the new range.

MEMSPEL & MEMSPAN

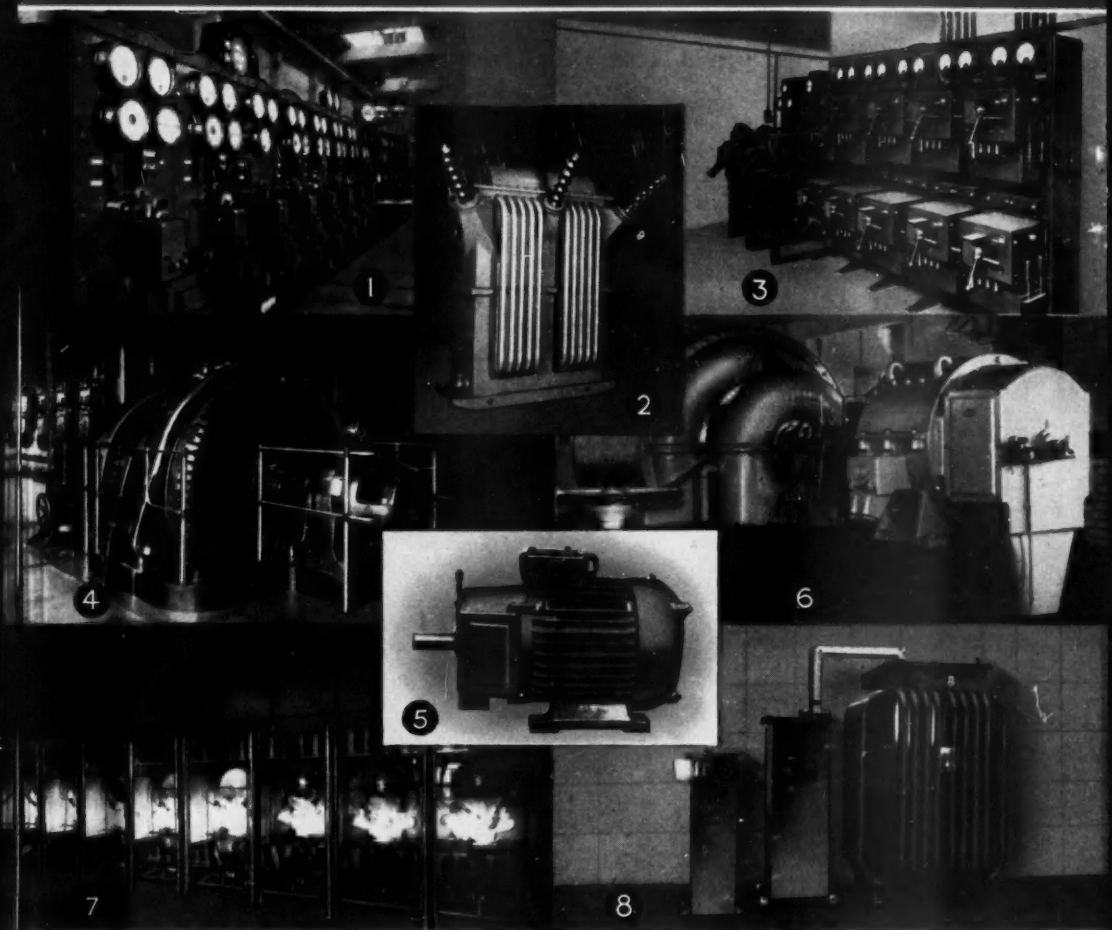
are the steel-clad and all-insulated versions of an entirely new range of switch fuse gear designed by MEM for single pole and neutral installations. All the skill of MEM's design team has gone into this job. Outstanding features are extreme compactness and simplicity of wiring—slow break A.C. switch, choice of BS1361 cartridge or rewirable fuses with interchangeable carriers, and effective interlocking. Available in steel-clad and all-insulated units for 15, 30 and 60 amps including 2, 3 and 4 way splitters.

You will be delighted with the excellent design and fine workmanship, particularly when you check the attractive prices.

MIDLAND ELECTRIC MANUFACTURING CO. LTD., TYSELEY, BIRMINGHAM 11

Branches in London and Manchester

COMPLETE INDUSTRIAL ELECTRIFICATION



1. H.T. Switchgear up to 250 MVA 11 kV
2. Power Transformers up to 10,000 kVA and 33 kV
3. L.T. Switchgear—various types available up to 3000 amperes capacity.
4. A large H.T. alternator with D.C. exciter (part of a diesel-engine set).
5. A typical A.C. motor, one of many available from stock.
6. D.C. Motors—all sizes. This is a 460 BHP Variable Speed Motor in use at a gas works.
7. Mercury-arc Rectifiers. D.C. services from A.C. mains, including VARISPEED drives.
8. Plating Rectifiers—200/3000 amperes capacities.

WHETHER YOU NEED ONE MOTOR OR A COMPLETE FACTORY INSTALLATION, THE SERVICES OF OUR SPECIALIST ENGINEERS ARE AT YOUR DISPOSAL

Established 1882

THE ELECTRIC CONSTRUCTION COMPANY LIMITED

Telegrams
ELECTRIC
WOLVERHAMPTON

Head Office and Works
BUSHBURY ENGINEERING WORKS
WOLVERHAMPTON

Telephone
WOLVERHAMPTON
21455 (7 lines)

Manufacturers of Rotating Electrical Machinery, Switch and Control Gear, Rectifiers and Transformers

In the Hall of Illumination...

The Benjamin R.L.M. — featured at the Festival of Britain as being characteristic of a direct lighting unit — is but one of a series of fitttngs that cover every need for good lighting. There is a unit specially designed to meet your exact requirements in the range of reflectors by

BENJAMIN REG'D.

"The Hall Mark of Good Lighting"

THE BENJAMIN ELECTRIC LTD.

(*Established* 1908)

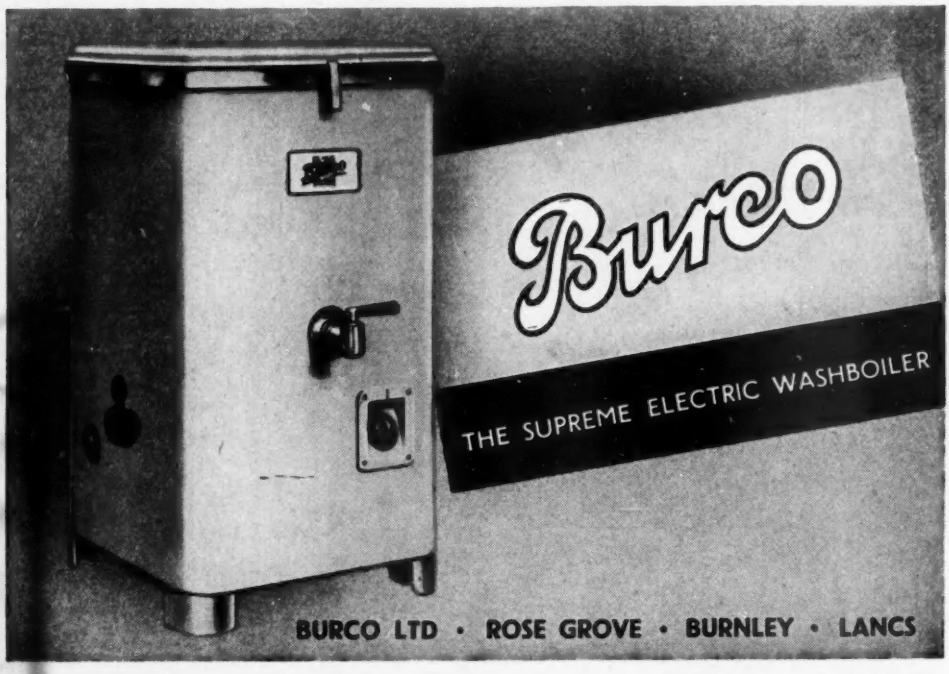
Brantwood Road, Tottenham, London N.17

Telephone: Tottenham 5252 (5 *lines*)
Telegrams: "Benjalect, Southtot, London"

BIRMINGHAM: **5 Corporation St., Birmingham 2.** *Midland* 5197

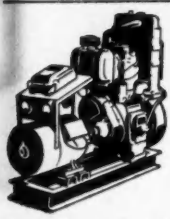
LEEDS: **49 Basinghall St., Leeds 1** *Leeds* 25579

A



"SHUPAX" DRUM TILT & STAND

For 40-45 gal. Drums. For easy and safe draining. Price £5.5.0 each. Used by Electricity Undertakings and Manufacturers of national repute.



"SHUPAX" ELECTRICITY GENERATORS

Cut in automatically on mains failure. Own reliable stand-by electricity supply with minimum upkeep and maximum efficiency.

"HYDRATRUCK" MOBILE HYDRAULIC LIFTER

For lifting drums, heavy moulds to press platen level, loading lorries, etc. Hand or electrically operated. Capacity 10 cwts. Maximum lift 4ft. 8in.

W. SHUPAK & Co. Ltd.

2, STOTHARD PLACE, BISHOPSGATE, LONDON, E.C.2

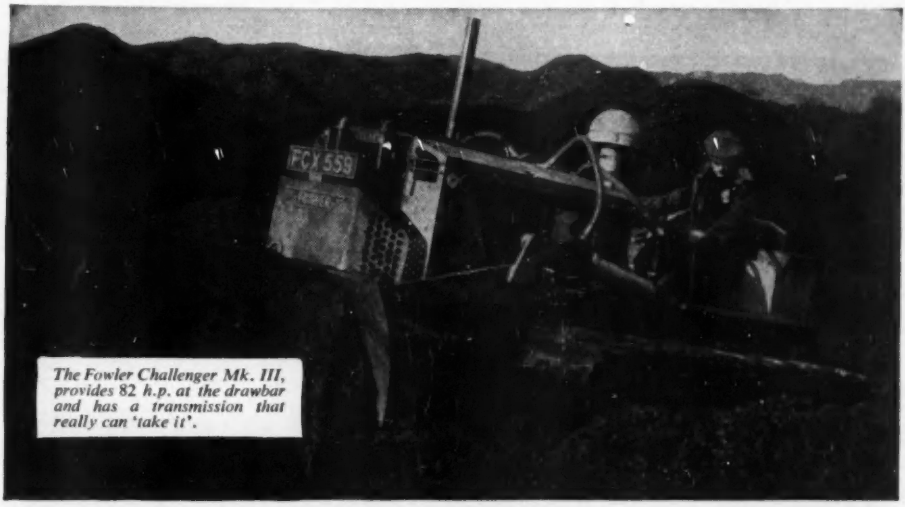
ASBESTOS WOVEN WIRE RESISTANCE NETS

COST SO LITTLE & HELP SO MUCH

Write or telephone today for full details, and technical advice if required.

CRESSALL

registered Trade Name of
The Cressall Manufacturing Co. Ltd.
"Tower Street, Birmingham 19.
Telephone: ASTon Cross 2666 (3 lines).
Telegrams: "OHMIC," Birmingham.



The Fowler Challenger Mk. III, provides 82 h.p. at the drawbar and has a transmission that really can 'take it'.

CRAWLERS IN POWER STATIONS

Cut coal-handling costs Control spontaneous combustion

COAL-HANDLING COSTS go right down when tough, reliable Fowler Challenger Crawlers move into storage yards. No other stacking method can match their flexibility of operation. The radii of jibs or the area swept by a gantry cease to be factors that determine stack locations. The only consideration in siting crawler-shifted stacks is convenience.

YARD AREA FULLY USED

Challengers save space. They are not bound to any particular area or supply point. Yard shapes can therefore be planned to make the maximum use of site area. Challengers handle ash in bulk with equal efficiency.

SURFACES SMOOTHED AND CONSOLIDATED

Risks of spontaneous combustion are lowest in yards which employ Challengers. Working directly on stack tops *and sides* they quickly produce a consolidated surface that offers the maximum resistance to air penetration.

SERVICE AND SPARES

British designed and British built, the Challenger is backed by a comprehensive service organisation. Spares or advice and assistance from factory-trained experts are available at short notice.

FOWLER LEEDS

CHALLENGER MARK III

BRITISH DIESEL CRAWLER

MANUFACTURED BY JOHN FOWLER & CO (LEEDS) LTD

A Product of the Marshall Organisation

Further particulars from **THOS. W. WARD LTD., Albion Works, Sheffield, 4,**

or direct from the manufacturers: **JOHN FOWLER & CO. (Leeds) Ltd., Leeds, 10.**

POWER

FOR ALL ELECTRO-DEPOSITION PROCESSES

Rectifier style R.O.P. 7/4000
output 7 volts 4,000 amperes

"Westalite" rectifiers are today supplying millions of amperes for all electro-deposition and allied processes, and are world renowned as dependable sources of D.C. power. Whatever the process and the power required, manual or automatic control, "Westalite" oil-immersed or air cooled equipments will meet your every need. They are static in operation. Maintenance is nil. Running costs are reduced to a minimum. Their high overall efficiency is maintained at a high value right down to the lightest load. Everything that is essential for good plating will be found in....

WESTINGHOUSE

WESTALITE

PLATING RECTIFIERS

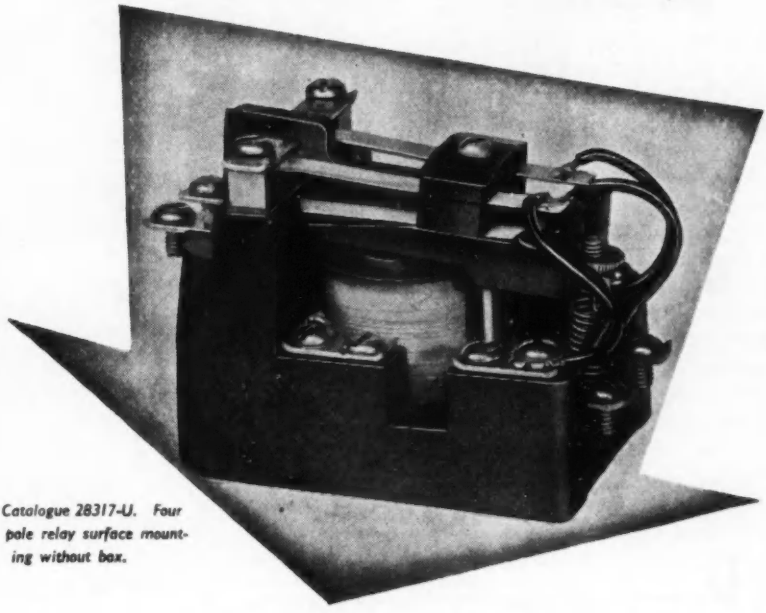
Write for Data sheet No. 44 to Dept. E.T. 13

WESTINGHOUSE BRAKE & SIGNAL CO LTD
82 YORK WAY KING'S CROSS LONDON N1

ARROW

PRECISION BUILT

MIDGET RELAYS



Catalogue 28317-U. Four pole relay surface mounting without box.

The most exacting specifications can be met by the ARROW midget relay. Many circuit arrangements may be built up on a moulded base from standard parts.

The contacts are silver to silver butt type amply proportioned to give a continuous rating up to 10 amps per pole at 220 volts A.C. Operating coils of low wattage and continuously rated — less than 3 watts D.C. — can be supplied for various voltages from 6 to 550 A.C. and from 6 to 230 D.C.

Available up to 4 poles normally open or normally closed, alternatively with various combinations normally open and closed. Supplied as illustrated, enclosed or for panel mounting.

ARROW midget relays are individually produced . . send NOW for full details.

ARROW ELECTRIC SWITCHES LTD

HANGER LANE · EALING
LONDON · W.5
Telephone : Perivale 4451

lighting fittings at Southampton Docks

'Perspex'—attractive, easily shaped and possessing good optical properties—has been used for many of the lighting fittings in the Ocean Terminal buildings at Southampton Docks.

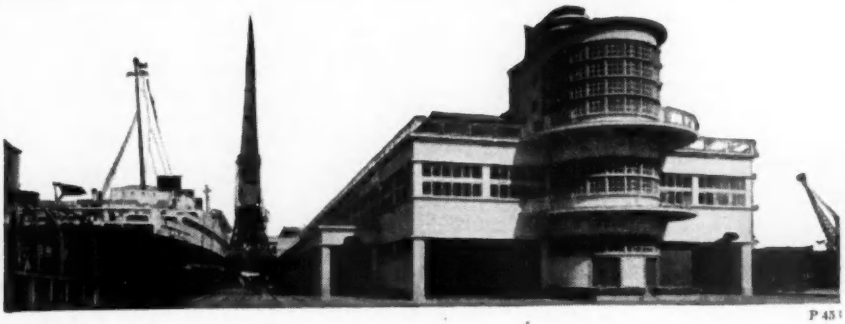
The fittings shown were manufactured by Falk Stadelmann & Co. Ltd., London.

Photographs by courtesy of Docks and Inland Waterways Executive.

ICI

'Perspex' is the registered trade mark of the acrylic sheet manufactured by I.C.I.

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.1



P 451

FOR USE WHEREVER PRECISION MEASUREMENTS ARE REQUIRED

ELLIOTT PORTABLE INSTRUMENTS

There is a range of Elliott portable instruments for D.C. and A.C. measurements, each type specially designed to withstand the hard life which an industrial instrument is forced to live.

An exceptionally robust movement with generously proportioned jewelled bearings, an efficient magnetic system with powerful working forces plus fine craftsmanship throughout design and manufacture ensure sustained accuracy . . . characteristic of Elliott instruments for over a century and a half.

Details of Elliott portable industrial and laboratory pattern meters for A.C. and D.C. volts, amps and power, free on request.

PHASE ROTATION INDICATOR

A handy instrument for meter and relay engineers, switchboard erectors, etc., suitable for 60 to 500 volts, 25-500 c.p.s. *Send for publication G.25.*

PORTABLE POWER FACTOR FINDER

Invaluable to electrical engineers concerned with p.f. corrections of single and polyphase installations. Indications from 0.25 lead to 0.25 lag. 100 to 250 volts, 0.5 to 7.5 amps. *Send for publication G.27/30.*

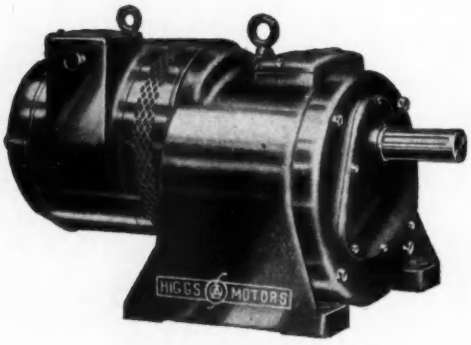
ELLIOTT BROTHERS (LONDON) LTD., CENTURY WORKS, LEWISHAM, LONDON, S.E.13

TRADE MARK

HIGGS MOTORS LTD.

CHAIRMAN WALTER F. HIGGS, M.I.E.E.

BIRMINGHAM 6 ENGLAND



We are one of the few firms completely manufacturing motor and gear box; we grind all gears calling for this operation, and believe we are the only electric motor firm in this country making gear units with ground gears

GUARANTEED FOR EVER

Belfast, Birmingham, Bristol, Cardiff, Dundee, Glasgow, Leeds, London, Manchester, Newcastle, Peterborough, Sheffield, Wolverhampton

"Hi, there... let me out of here!"

says
JACK SCRAP

How many thousands of tons of iron and steel scrap are there locked up in factories and yards all over the country? Every ton of it reclaimed and sent to the steel furnaces may mean an extra ton of new steel for industry and defence.

The nation can't afford to waste this essential raw material. How much can you find? Round it up — send it in.

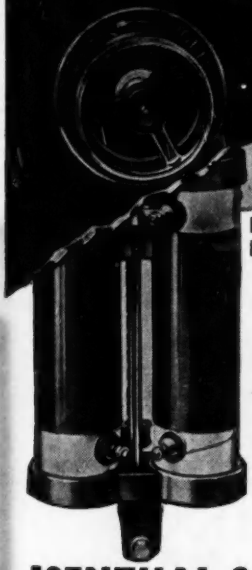
Scrap Merchants everywhere will gladly help with dismantling and collection.

WANTED
from the
ELECTRICAL INDUSTRY
Old engines and transformers and *every kind* of general and process scrap and obsolete plant.

SPEED THE SCRAP SPEED THE STEEL

Issued for the STEEL SCRAP DRIVE by the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1
T.8

Precision Control



by **ISENTHAL**
Sliding RHEOSTATS

Designs for "Back of Board" or for bench mounting for laboratory work

Giving a performance superior to that of the finest multi-contact rheostats, ISENTHAL Tubular Sliding RHEOSTATS are designed to stand up to continuous heavy service and provide infinitely variable current in the circuit. Main insulation is of Vitreous Enamel. Terminal stems are so constructed that they cannot turn and allow the wire to slacken or break.

We will gladly supply full details upon request.

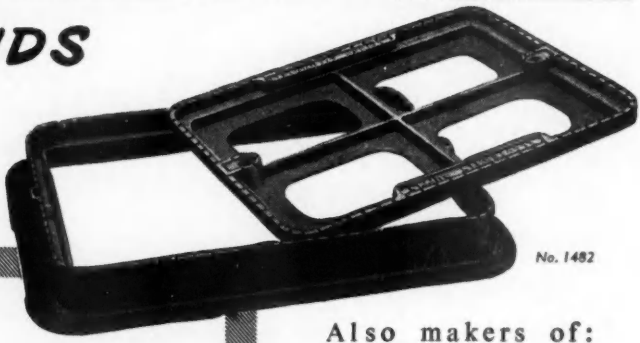
OUTSTANDING ADVANTAGES INCLUDE:

- **Finer Regulation**
- **Greater Accessibility**
- **Light Weight**
- **Better Space Factor**
- **Self-Cleaning Contacts**
- **Robust Construction**

ISENTHAL & CO. LTD. Ducon Works, Victoria Road
NORTH ACTON, LONDON, W.3. *Telegrams: ISENTHAL. LONDON.* *Tel.: ACOrn 3904*

1s4

THOUSANDS have been SOLD...



No. 1482

ROUND CORNERED PAVEMENT COVERS AND FRAMES
16 Standard Sizes

Also makers of:
Roadway Covers and Frames · Lamp Pillars and Brackets · Kiosks and Pillar Casings

ESTABLISHED 1814

HARDY & PADMORE LTD., WORCESTER. Tel: WORCESTER 3215

M-W.101

Taylor
Tunnicliff (REFRACTORIES) Ltd

ALBION WORKS LONGTON STOKE ON TRENT

TELEPHONE: STOKE ON TRENT 5272

LONDON OFFICE. 125 HIGH HOLBORN, LONDON, W.C.1 TELEPHONE: HOLBORN 1951

Heatrae

ELECTRIC

INDUSTRIAL AIR HEATERS

of proved and tested design, and exceptionally robust construction

•

FLAMEPROOF TYPE

for use in places where inflammable vapour is present

•

NON-FLAMEPROOF TYPE

for general use in Factories, Stores, Printing Shops, etc.

•

PLEASE SEND US YOUR ENQUIRIES

Heatrae

HEATRAE LTD • NORWICH • ENGLAND

Manufacturers of: Electric Water Heaters, Oil Heaters, Immersion Heaters, Urns, Towel Rails, Airing Cupboard Heaters, Flame-proof Heating Apparatus, Breakfast Cookers, Electric Fires, Food Trolleys, Warming Plates, Air Heaters.

Efficient TROUGH LIGHTING

Industrially yours

SB

OPEN END TROUGH

Cat. No. O.T. 14. Single 4'-40W. Lamp
Cat. No. O.T. 24. Twin 4'-40W. Lamps
(Also available in 5'-80W. Single or Twin Lamps)

Reflector manufactured from Duralumin and finished internally White, externally Grey stoved enamel . . .

CLOSED END TROUGH

Cat. No. C.T. 15. Single 5'-80W. Lamp
Cat. No. C.T. 25. Twin 5'-80W. Lamps

Manufactured in one piece from Aluminium, overall finish White stoved enamel.

If you have any LIGHTING PROBLEMS — Consult our TECHNICAL DEPT.

For Full Details and EXPORT PRICES write to :—

SMART & BROWN (ENGINEERS) LIMITED

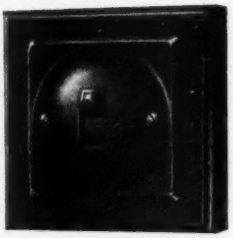
TRADING ESTATE, SPENNYMOOR, CO. DURHAM

HAVE YOU ANY PROBLEMS RELATING TO THE NEW I.E.E. REGS: 403 I, 404 J ?

You have?

Then why not write us about them?

After all Tenbyluxe and Tenby Pilot Surface Switches may go a long way towards solving your difficulties!



Tenby ELECTRICAL ACCESSORIES

MANUFACTURED BY S. O. BOWKER LTD.

Birmingham:	19-21 Warstone Lane, Birmingham 18.	Tel.: CENtral 3701
London:	54-56 Oxford Street, W.1.	Tel.: MUSeum 4695
Manchester:	85 Mosley Street, Manchester 1	Tel.: CENtral 0051
Leeds:	5 Park Place, Leeds.	Tel.: Leeds 23793

5627E1

HANDICAPPED!

Dermatitis, production's greatest enemy, can soon put the best hands out of action. Where industrial irritants—insulating varnish, shellac, transformer and lubricating oils — are being constantly handled, Rozalex is essential. It creates a barrier against dermatitis. There is a type for every trade. Send for free sample and leaflet "The Skin in Industry" to Rozalex Ltd., 10 Norfolk Street, Manchester 2.

ROZALEX

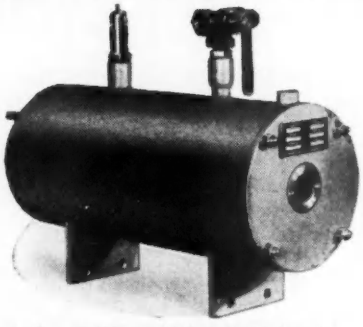
DERMATITIS BARRIER PREPARATIONS

"Dunlow"

ELECTRIC STEAM RAISER

for

FARMS and OTHER PURPOSES

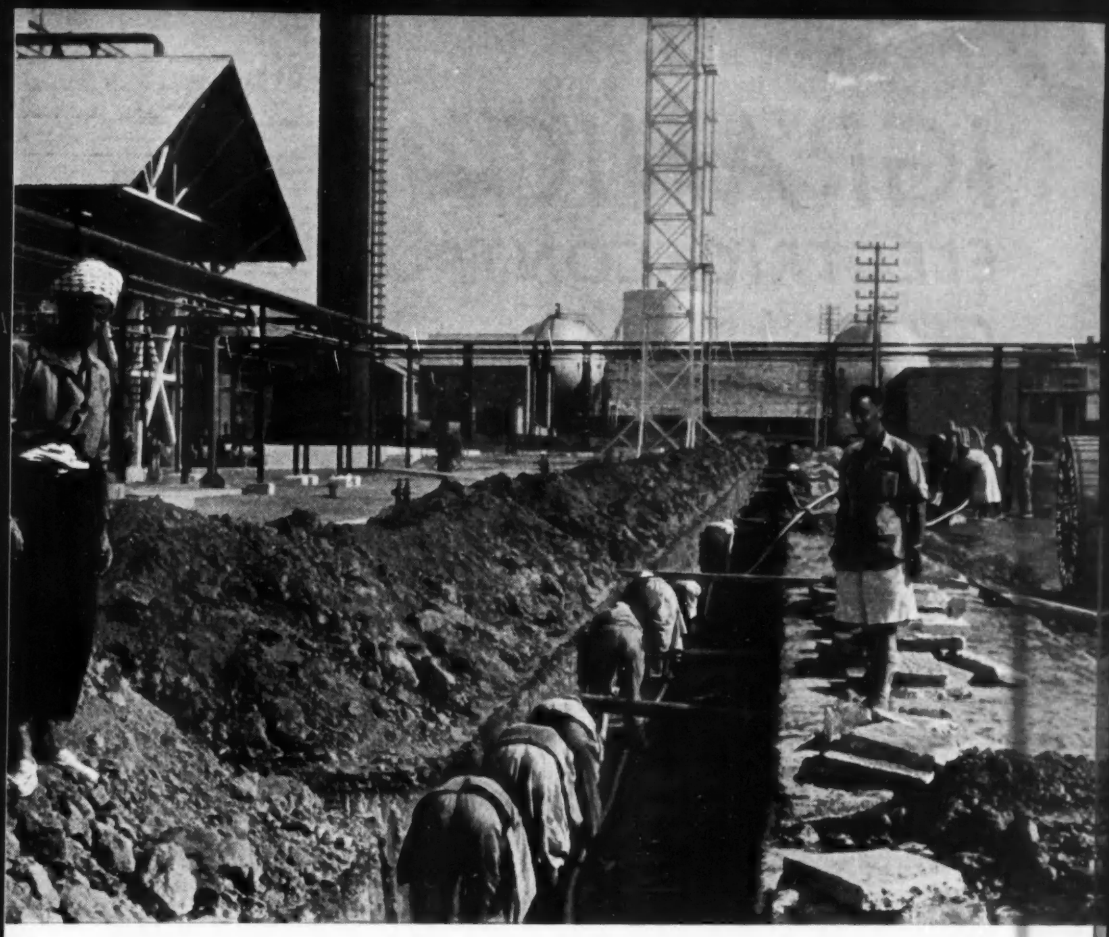


6, 9 and 12kw—W.P. 10 lbs./sq. ins
Single or Three Phase
Automatic Feed and Low Level Safety Switch

DUNCAN LOW LTD.

290 BELL STREET, GLASGOW, C.4.

Phone: Bell 1961-2 'Grams: "Immerser, Glasgow"



ELECTRIFICATION OF KIRKUK OIL FIELDS

— IRAQ PETROLEUM COMPANY

The development of the Kirkuk Fields and the installation of a processing plant capable of handling an output of 20 million tons per annum of crude oil necessitated an electrification scheme of major proportions. The scheme comprised the building of a new power station, Kirkuk 'B,' having a capacity of 70,000 kVA, and the construction of a distribution network with two 66 kV outdoor sub-stations and eighteen 11 kV sub-stations.

J. & P.—who have played a leading part in many Middle East electrification schemes since they undertook the first electrification scheme at Abadan in 1922—were awarded the following contracts :—

1. The planning and installation of the entire cabling of Kirkuk " B " Station.
2. The design and erection of the two 66 kV outdoor sub-stations.
3. The design and erection of 40 miles of 66 kV overhead line, and associated 11 kV distribution lines.
4. The entire cabling of the eighteen sub-stations and the installation of the associated cable systems.
5. Cabling of the Process Plant.
6. The complete electrification of a new township planned to comprise 1300 houses. The work included the underground distribution network, house services, street lighting, etc.

For electrification schemes of this nature, J. & P. are in a unique position. Not only are they manufacturers of so much of the equipment, but their extensive experience in the planning and execution of such schemes enables them to relieve the customer's own staff of much of the engineering design work and to carry out the installation.

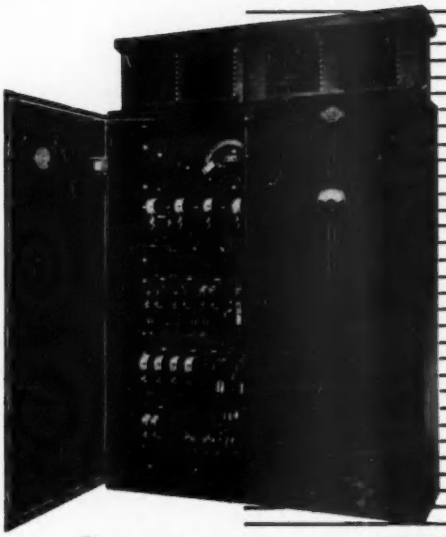
The mark that means that "little more" *in quality*

JOHNSON & PHILLIPS LTD., CHARLTON, LONDON, S.E.7

IGRANIC
ELECTRIC CONTROL GEAR

There are qualities in the design and construction of Igranic motor control gear which make it first choice of discriminating engineers throughout this country and abroad.

Many years' experience and constant co-operation with manufacturers and users of electrically operated machinery has enabled us to produce control units which are pre-eminently suited to the specific requirements of each particular industry.



Three-motor Control Panel for large boring machine Approximate height 7-feet.

A TYPE FOR EVERY DUTY

HEAD OFFICE AND WORKS - BEDFORD

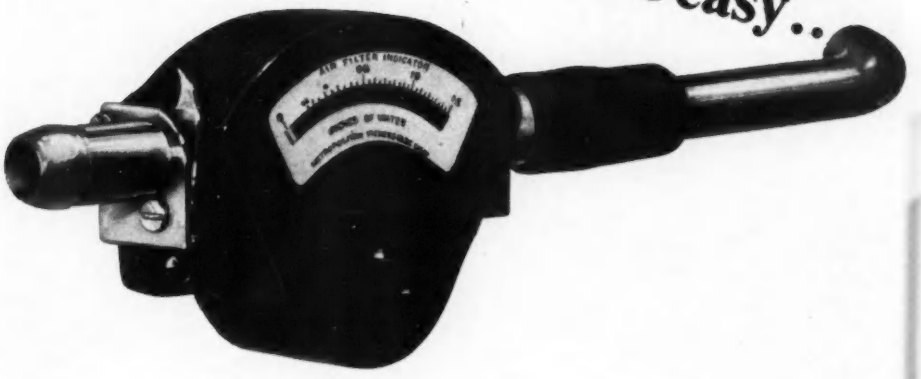
EXPORT DEPT.:—VICTORIA STATION HOUSE, 191 VICTORIA STREET, LONDON, S.W.1

ELECTRIC IGRANIC CO. LTD.

BRANCH OFFICES:—

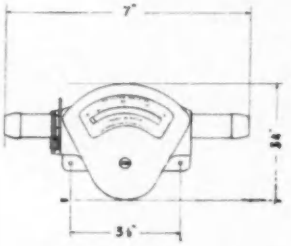
LONDON · BIRMINGHAM · BRISTOL
CARDIFF · GLASGOW · LEEDS
MANCHESTER · NEWCASTLE · SHEFFIELD

Filter inspection, quick and easy..



Metrovick Air Filter Indicators for more efficient air-conditioning

This inexpensive, easily installed little instrument-something entirely new on the market—makes the routine inspection of air-conditioning filters quick and easy. The ordinary method of withdrawing each cell for visual inspection is time-wasting and laborious, cells in good condition often being needlessly removed. With the Indicator permanently fitted across the filter battery the need for cleaning can be judged by a glance at the dial pointer. A valuable feature is the finger operated spring-return valve which safeguards the indicator from being clogged with dust, the valve being open only when a reading is being taken.



Write for Publication E.S.4352/1 and visit the British Instrument Industries Exhibition in the National Hall, Olympia (Stand 6, Row D, Ground floor).

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFORD PARK, MANCHESTER, 17
Member of the A.E.I. group of companies

METROVICK *Instruments for Industry*

G/A101

B

TEMCO Switches

ARE SUITABLE FOR ALL PARTS OF ALL AREAS

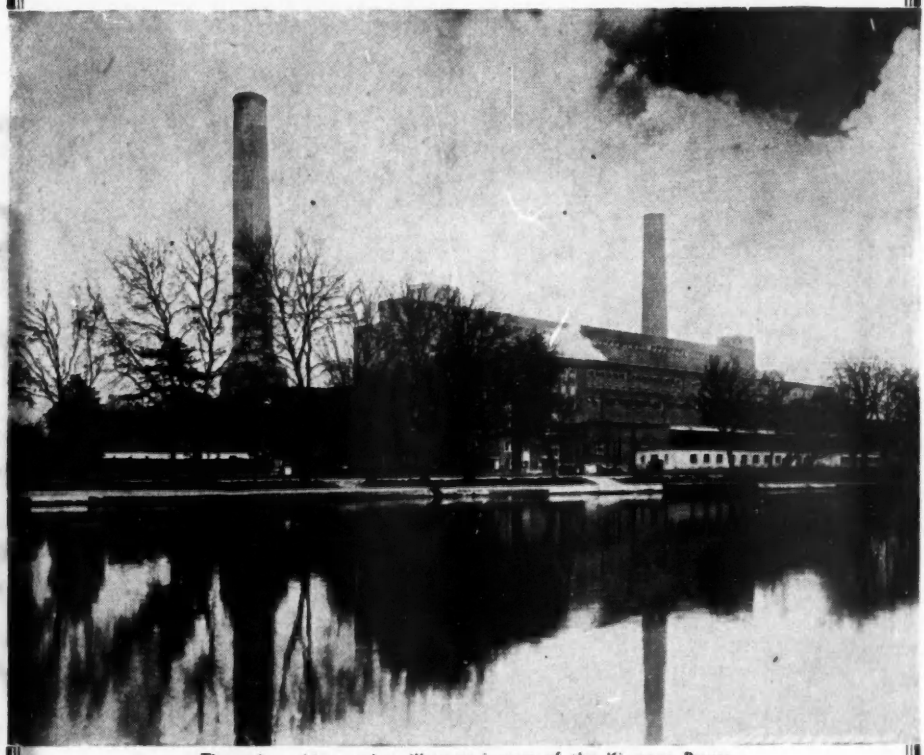
TEMCO Switches comply with B.S.S. 816 and are made to the same high standard of quality as all TEMCO Accessories. The quick make-and-break underslung action is semi-positive and the spring contacts are self-adjusting. The base is of best quality porcelain, while the dolly and cover are moulded. The dolly has no metal insert. Supplied in surface, semi-recessed and flush patterns in brown on white, all brown, or all white finishes. Switch plates up to four gang in brown or white available for use with flush Switches. Complete Accessory Catalogue available on request.

T. M. C.-HARWELL (SALES) LTD

37 UPPER BERKELEY ST., LONDON, W.1 *Telephone:* Paddington 1867-8-9

A load that will carry a load.
SUBMARINE
POWER CABLE
protected with
a Special Sheath
SIEMENS
LONDON
SIEMENS BROTHERS & CO., LTD. WOOLWICH LONDON, S.E.18

WAKEFIELD OIL FOR INDUSTRY

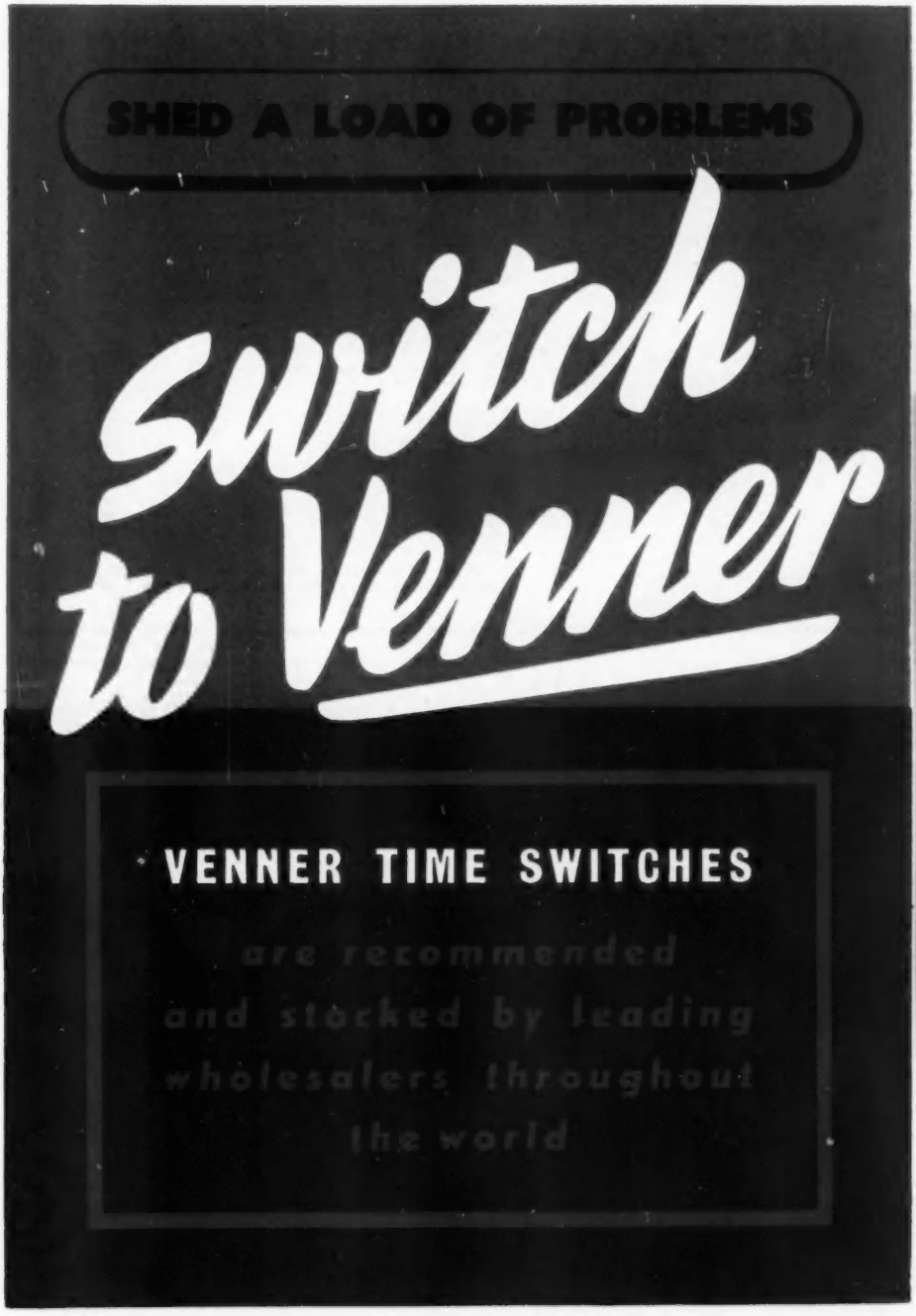


The main turbines and ancillary equipment of the Kingston Power Station are lubricated exclusively with Wakefield Industrial Lubricants.

British Electricity Authority use

INDUSTRIAL
WAKEFIELD
LUBRICANTS

C. C. WAKEFIELD AND COMPANY LIMITED · LONDON · W.1


SHED A LOAD OF PROBLEMS
switch to Venner
VENNER TIME SWITCHES
are recommended
and stocked by leading
wholesalers throughout
the world

HART ACCUMULATOR CO. LTD.,

Chequers Lane, Dagenham Dock, Essex

Manufacturers of

STORAGE BATTERIES FOR ELECTRIC LIGHTING AND POWER INSTALLATIONS

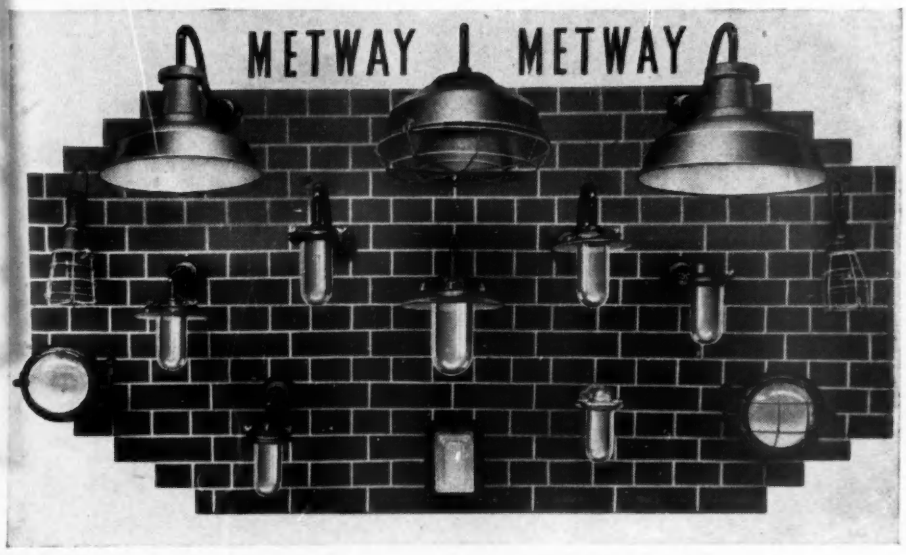
EMERGENCY LIGHTING EQUIPMENTS
for Hospitals, Cinemas, Theatres, Public Buildings, Hotels, Business Premises, Factories, Ships, etc.

PRICES ON APPLICATION

BY APPOINTMENT TO H.M. THE KING MAKERS OF ACCUMULATORS

Telephone: RAINHAM 34

Branches at Birmingham, Bristol, Cork, Dublin, Glasgow, Manchester, Newcastle-on-Tyne, Nottingham, and Westminster.

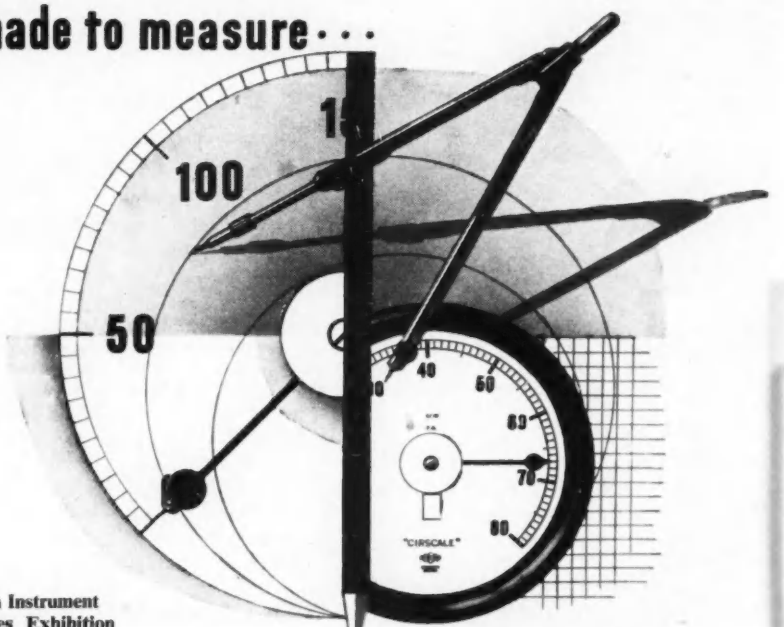


Send 6d. stamps for 40-Page LIST NO. ALG/30/T.E.

METWAY ELECTRICAL INDUSTRIES LTD.
KING STREET, BRIGHTON 1

Phone: Brighton 28366
Grams: Metway, Phone, Brighton

made to measure . . .



ACCURATELY

British Instrument Industries Exhibition Olympia STAND No. 7 E July 4—14

The man who knows exactly what his machine is doing—who has accurate, constant and visual indication of its Consumption; its Speed; its Output, etc. is wise.

But, one who uses a "RECORD" Electrical Measuring Instrument is wisest. It is made to measure—ACCURATELY, by those who were the pioneers of the "CIRSCALE" and who have kept ahead.

RECORD

"RECORD" Instruments include:—
Switchboard Instruments, "Cirscale" Switchboard Instruments, Portable Instruments, Insulation and Resistance Test Sets, Cut-Outs, "Cirscale" Electric Tachometers, Current Transformers, Chart Recorders, Shirley Moisture Meters, Shirley Static Eliminators.

THE RECORD ELECTRICAL COMPANY LIMITED

BROADHEATH · ALTRINCHAM · CHESHIRE

Phone: Altrincham 3221/2/3
London Office: 28 Victoria Street, London S.W.1
Grams: "Cirscale" Sowest, London

Cables and Grams. "Cirscale" Altrincham
Phone: Abbey 5148 and 2783
Cables: "Cirscale" London

SUNVIC

INDUSTRIAL CONTROLS and ELECTRONIC INSTRUMENTS

see our Exhibits on **STAND No. 5E**

BRITISH INSTRUMENT INDUSTRIES EXHIBITION.

Vacuum pumping equipment, high speed recorders, radiation pyrometers, thermostats, energy regulators, electronic relays, time-delay switches, hotwire vacuum switches, DC amplifiers, resistance thermometers and controllers, proportioning heads for toluene regulators and creep test control equipment and furnaces.

Member of the A.E.I. Group of Companies

SUNVIC CONTROLS LIMITED

Sunvic House, 10, Essex Street, Strand, London, W.C.2

Telephone: TEMple Bar 7064. Telegrams: Sunvic, Estrand, London

TAS/SC263

WOOTTON

METER BOARDS

AND SWITCH BLOCKS

We have been making and supplying the Electrical Industry with METER BOARDS and Switch Blocks for over 27 years

- *FIRST CLASS WORK*
- *QUICK DELIVERIES*
- *COMPETITIVE PRICES*

We invite your enquiries

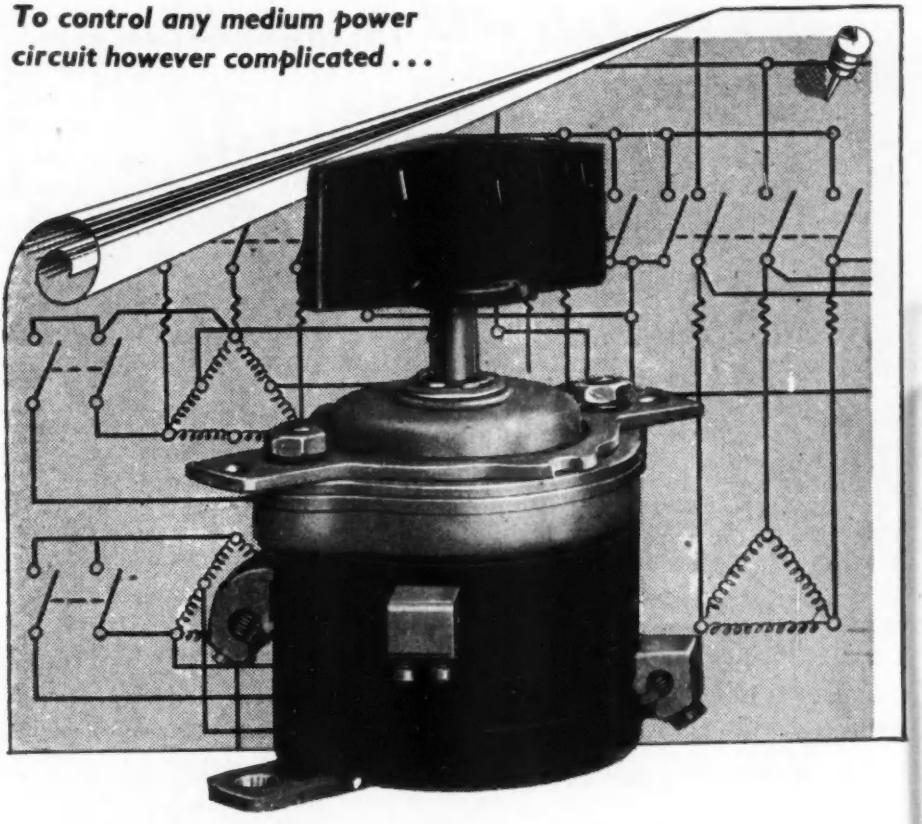
WOOTTON & CO., LTD.

ALMA WORKS, PONDERS END, MIDDLX.

TELEPHONE: HOWARD 1858

L1048A

To control any medium power circuit however complicated . . .



. . . there is a ready-made type of

SANTON ROTARY SWITCH!

SANTON switches operate on a simple rotary movement.

SANTON switches have large, easily accessible terminals, plainly marked.

SANTON switches are available from 10-60 Amps. (180 under special conditions), any number of poles up to six positions—up to 660 volts.

SANTON switches can be delivered promptly and give years of trouble-free service.

Most areas have a SANTON Resident Engineer who will be pleased to call and discuss your switching problems with you. Take the first step today towards simpler, more efficient control.

TRADE MARK: SANTON

Write or phone

SANTON LTD., NEWPORT, MON. *Tel. 71711 (10 lines)*

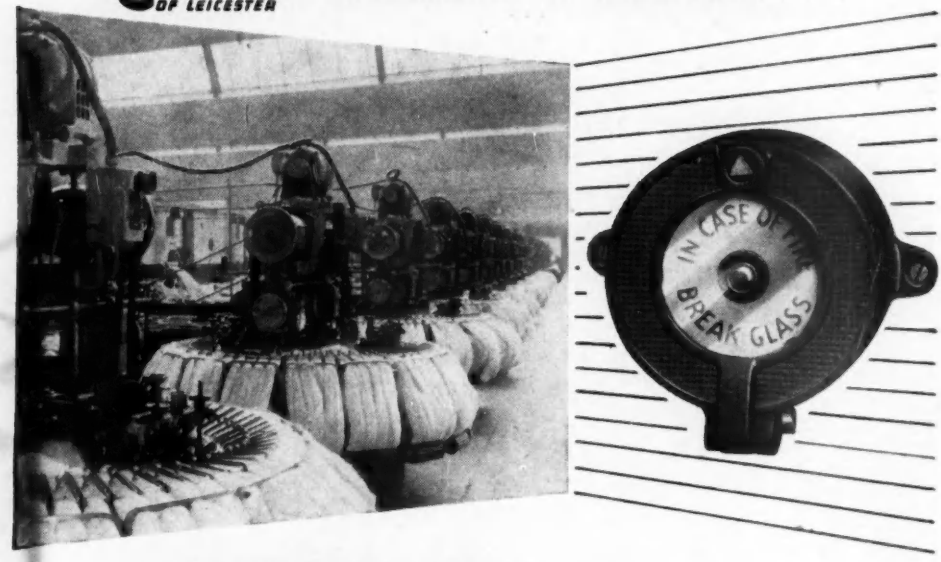
London: Sloane 2158 *Manchester: Central* 1394/5

Leeds 59361 *Birmingham: Midland* 6421 *Torquay* 7100

17161

NEWPORT SANTON MON. ENG.

GENTS' OF LEICESTER PRODUCTS IN INDUSTRY...



No 2 KNITTING WOOL

Lives, property, plant, materials and vital production are all in danger when fire breaks out in industrial premises. Against this ever-present threat the first line of defence is a Fire Alarm System which can be relied upon. The quality of every piece of equipment in such a system must therefore be beyond doubt.

That is why, for the new 34-acre, £6,000,000 factory of Patons and Baldwins Ltd., at Darlington, the choice was

GENTS' OF LEICESTER | **FIRE ALARM EQUIPMENT**

Write for a copy of "Fire Alarm Systems" which gives particulars of systems to suit all requirements.

GENT & CO. LTD., FARADAY WORKS, LEICESTER

London: 47, Victoria Street, S.W.1. Newcastle 1: Tangent House, Leazes Park Road.

Other products for Industry: ELECTRIC CLOCK SYSTEMS, BELLS AND INDICATORS. BURGLAR ALARMS WATCHMAN'S TELLTALE CLOCKS. STAFF LOCATORS. PROCESS TIMERS. LIQUID LEVEL CONTROL EQUIPMENT

'ENGLISH ELECTRIC'

house service meters

Single-phase range in metal and moulded cases

'English Electric' produce a full range of single-phase house service meters in both moulded insulated and all-metal cases. The range covers standard current ratings of 2½, 5, 10, 25 and 50 amps.

The meters are temperature compensated, are of standard dimensions and "long range" to B.S. 37—1937, and are covered by all approval certificates. Accurate manufacture of each component part and accurate assembly by skilled operators ensure that 'English Electric' house service meters, which are simple to calibrate, sustain their accuracy under all normal operating conditions.

Write for publications: MS 1001 (all-metal case), and MS 1002 (moulded insulated case).

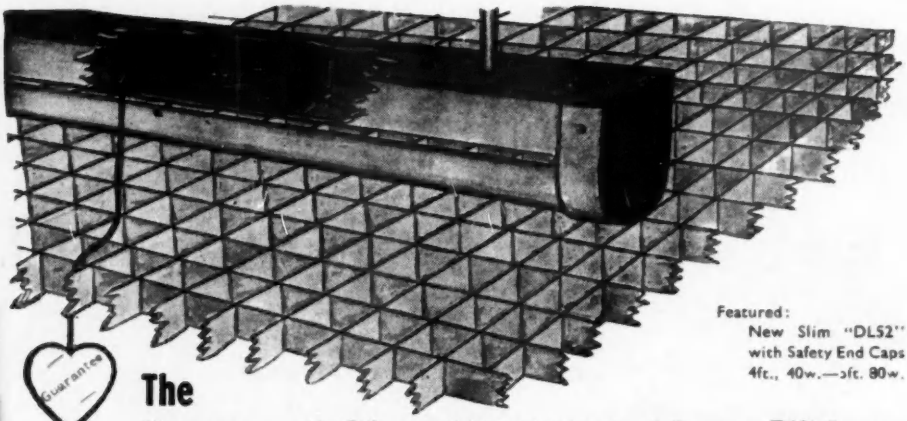
The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Instrument Works, Stafford

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

EM.4



Featured:
New Slim "DLS2"
with Safety End Caps
4ft., 40w.—3ft. 80w.

The Unseen and Silent HEART of Lamp Efficiency

Control gear is the heart of a fluorescent fitting—on its performance depends not only the life of the whole unit but also Electrical Contractors' goodwill with clients.

Built to better than accepted standards Scemco Control Gear prolongs lamp life and assures the new standard of 5,000 burning hours recently announced by leading Fluorescent Lamp Manufacturers.

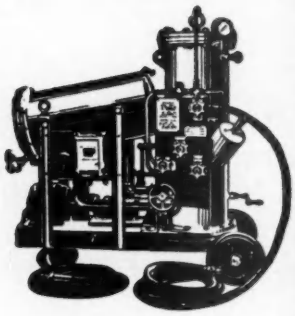
"SCEMCO — MEANS SATISFACTION GUARANTEED"

GERRARD 1461-2-3 **SCEMCO LTD.,** SOHO ST., LONDON, W.1

• SEND FOR 20-PAGE ILLUSTRATED CATALOGUE AND PRICE LIST •

Cold Filtration of Insulating Oils

The insulating value of used transformer and switch oils by one passage through the Metafilter is raised to a higher break-down voltage than the new oil.
The plant is purely mechanical and extremely simple in operation.



Capacities from 20 gallons to 1,000 gallons per hour.

METAFILTRATION

PHONE:
HOUNSLOW 1121-2-3
GRAMS:
METAFILTER, HOUNSLOW

THE METAFILTRATION COMPANY LIMITED, BELGRAVE ROAD, HOUNSLOW, MIDDLESEX

NALDERS

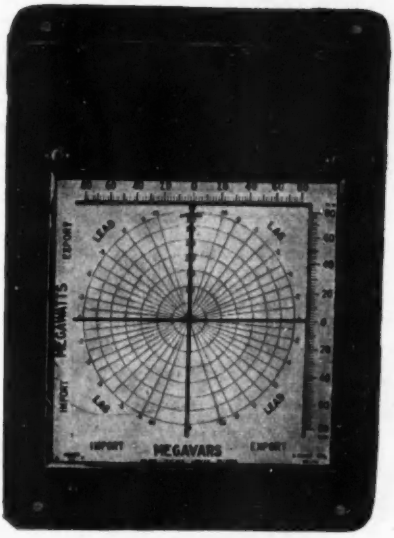
VECTORMETER

NALDER - IVTCHER - LIFMAN PATENTS

New Development

N C S

For the **CONTROL ROOM**



The N.C.S. VECTORMETER gives simultaneous readings of Megawatts, Megavars, Amperes and Power Factor of the three-phase system in which it is connected. It shows also whether Power is being "Exported" or "Imported."

Indication is by two pointers moving at right angles and in straight lines over a common dial. The Megawatt, Megavar and Ampere scales are each 6 in. long.

Prices and further particulars on request.

OTHER N.C.S. PRODUCTS include:

Indicating and Recording Instruments of all types, Protective Relays, Synchronisers, Circuit Breakers, etc. The N.C.S. Trade Mark is a guarantee of excellence in design and manufacture.

BRITISH INSTRUMENT INDUSTRIES EXHIBITION
OLYMPIA · LONDON
JULY 4TH to 14TH 1951

STAND No.
2
ROW F
GROUND
FLOOR

NALDER BROS. & THOMPSON LTD

Phone: CLISSOLD 2365 (3 lines) DALSTON LANE WORKS Grams: OCCLUDE, HACK, LONDON

LONDON, E.8

Yes! Ask her. Ask your customer what she looks for in a cooker—in addition to the meat ration! B.N.E. asked Supply Authorities serving one and a quarter million consumers what they wanted, and incorporated their requirements in the Model C.49. As a result the specification includes more desirable features than have ever before been built into one cooker, not the least of them being the very attractive appearance . . . . . Send for full details now.

- ★ CAST-IRON MAIN FRAME AND HOB.
- ★ CONFORMS TO B.S. 1195 AND E.D.A. SPECIFICATION FOR INTERCHANGEABILITY.
- ★ VERY LARGE OVEN AND HOT-CUPBOARD WITH DROP-DOWN COUNTERBALANCED DOORS.
- ★ HOB AND OVEN EQUIPMENT DESIGNED FOR RAPID REMOVAL AND CLEANING.
- ★ EASY CONVERSION FROM 2 TO 3 PLATE.

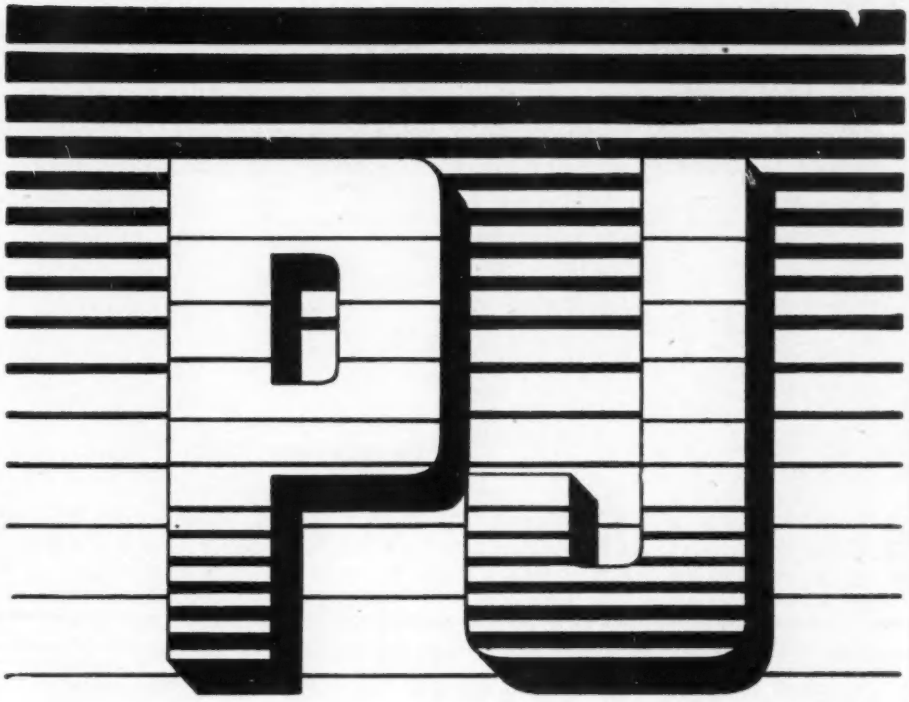
The B.N.E. Model C.49

The Cooker that has everything

BRITISH NATIONAL ELECTRICS LTD.

THE DOMESTIC APPLIANCES SECTION OF
JOHNSON & PHILLIPS LTD.
NEWARTHILL · MOTHERWELL · SCOTLAND

A BNE Product
OF JOHNSON & PHILLIPS LTD



Steel Sheets for the

Electrical Industries

PARTRIDGE, JONES & JOHN PATON LTD

PONTNEWYNDD, NEAR PONTYPOOL

TELEPHONE PONTYPOOL 131/2

5710

Electrical Insulation

MICA

Washers
Plates
Commutator Segments
Stampings
Stove Plates
Heater Strips, etc.

MICANITE

Mouldings, Commutator V... Rings, Tubes, Covered Bars, Commutator Segments, Heater Strips, Sheet Material in Moulding, Flexible, Heat Resisting and Commutator Qualities, etc.

BAKELITE

Tubes
Bushes
Bobbins
Washers
Stampings
Panels
Covered Bars, etc.

Manufactured by

EAST LONDON MICA WORKS

RINGWOOD ROAD, WALTHAMSTOW, LONDON, E.17

'Phone: KEYstone 4254 *Telegrams: Elmicmer, Easphone, London*

SMITH LITE

EST. 1896

TUNGSTEN FITTINGS

The illustrations show just a few of the Smithlite range of Tungsten fittings. These, like our Fluorescent range, are unsurpassed for QUALITY, VALUE AND FINISH

WRITE TODAY FOR COMPLETE LISTS

HERMAN SMITH LIMITED

PHONE DUDLEY 4211/3 RELIANCE WORKS DUDLEY GRAMS RELIANCE DUDLEY

PASSFIELD COURT LEWISHAM

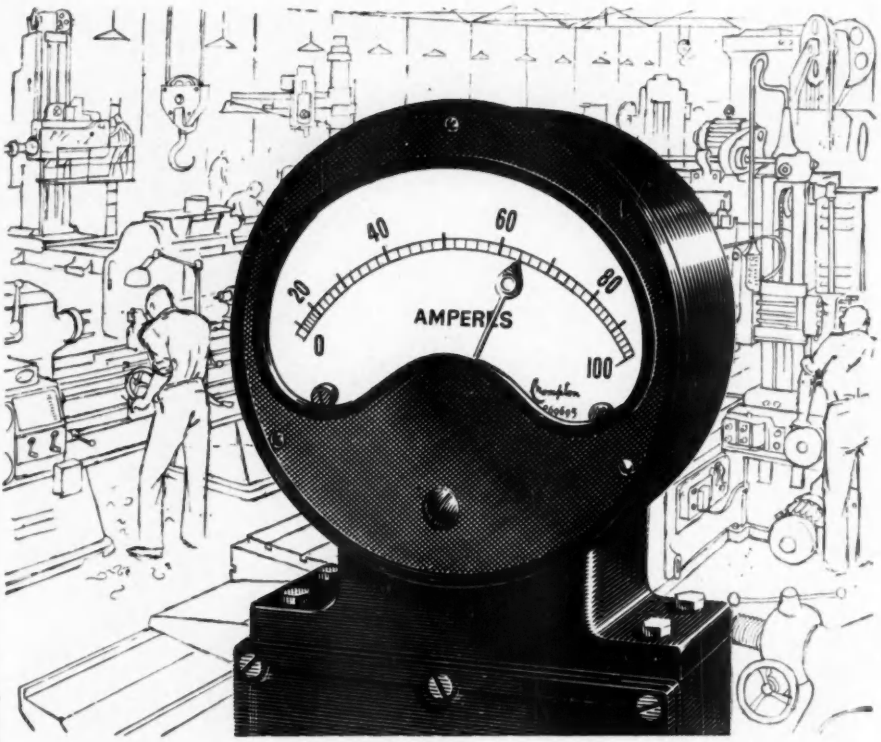
Designed for the Lewisham Borough Council by **Messrs. Fry, Drew & Partners,** this progressive housing estate consists of 101 flats in four blocks constructed in the unusual box frame method.

The Electrical Contractors, **Messrs. Brakefields Ltd.,** used approximately 22 miles of BICC cable for the entire electrical installation, which comprised over 1,000 lighting and heating points, together with an electrically equipped laundry and some public lighting.

B.I. Callender's

RUBBER INSULATED CABLES

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2



The right answer--

by

ELECTRICAL EQUIPMENT

Crompton Parkinson

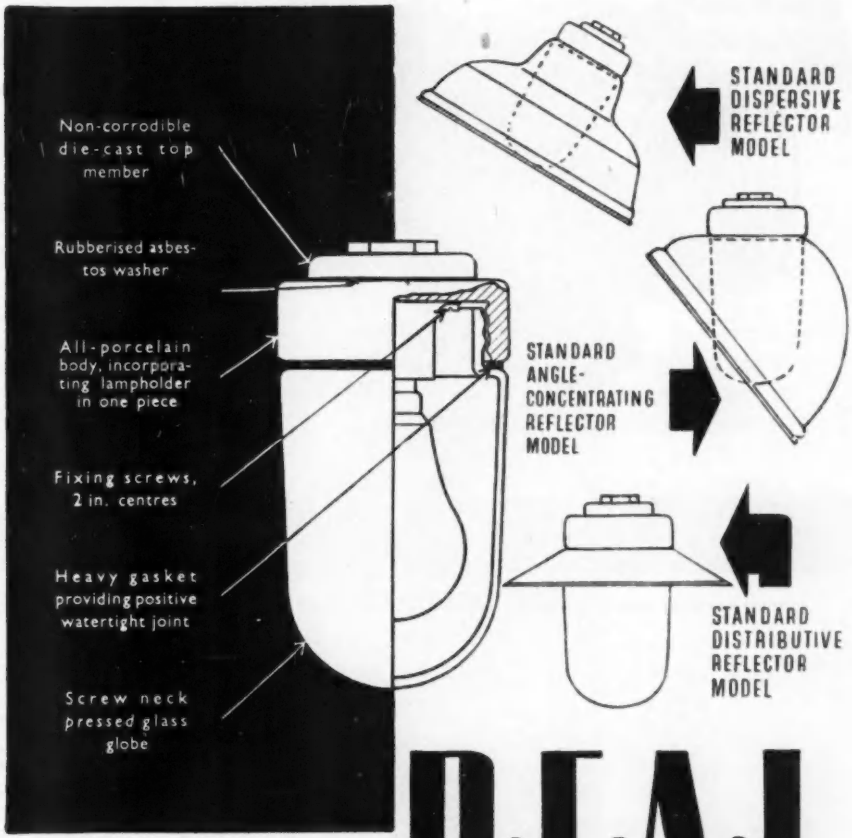
Instruments

FOR INDUSTRIAL AND EDUCATIONAL PURPOSES

See our exhibits on Stand No. 2, Row D, Ground Floor,
British Instrument Industries Exhibition, Olympia, July 4-14

CROMPTON PARKINSON, LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2.

Telephone : CHAncery 3333. Telegrams : Crompark, Estrand, London


Non-corrodible die-cast top member
Rubberised asbestos washer
All-porcelain body, incorporating lampholder in one piece
Fixing screws, 2 in. centres
Heavy gasket providing positive watertight joint
Screw neck pressed glass globe
STANDARD DISPERSIVE REFLECTOR MODEL
STANDARD ANGLE-CONCENTRATING REFLECTOR MODEL
STANDARD DISTRIBUTIVE REFLECTOR MODEL

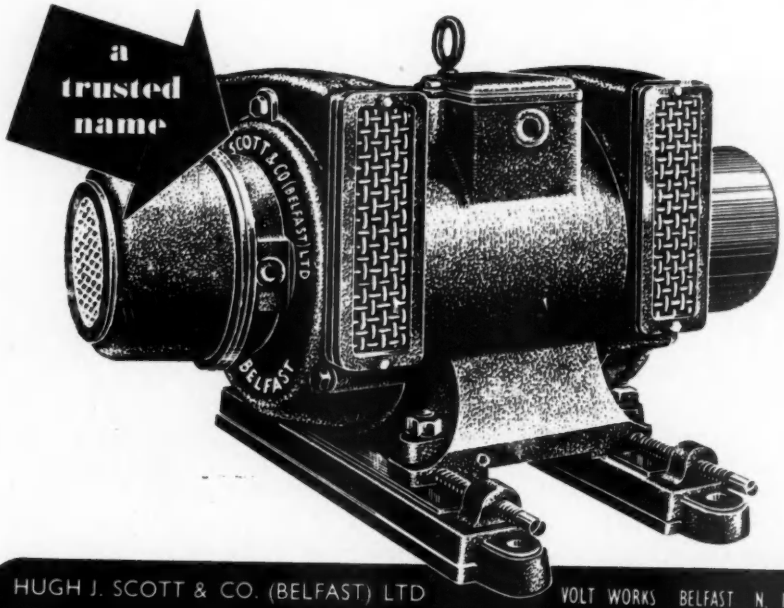
R·E·A·L

Non Corrodible Watertight Fittings

Send for Leaflet of Complete Range

60 WATT FITTINGS
100 WATT FITTINGS
200 WATT FITTINGS

Issued by ROWLANDS ELECTRICAL ACCESSORIES LTD., R·E·A·L WORKS, BIRMINGHAM, 18



HUGH J. SCOTT & CO. (BELFAST) LTD VOLT WORKS BELFAST N. IRELAND

MANUFACTURERS OF A.C. AND D.C. MOTORS AND GENERATORS UP TO 200 H.P.

REGISTERED M E C TRADE MARK

MUDIE

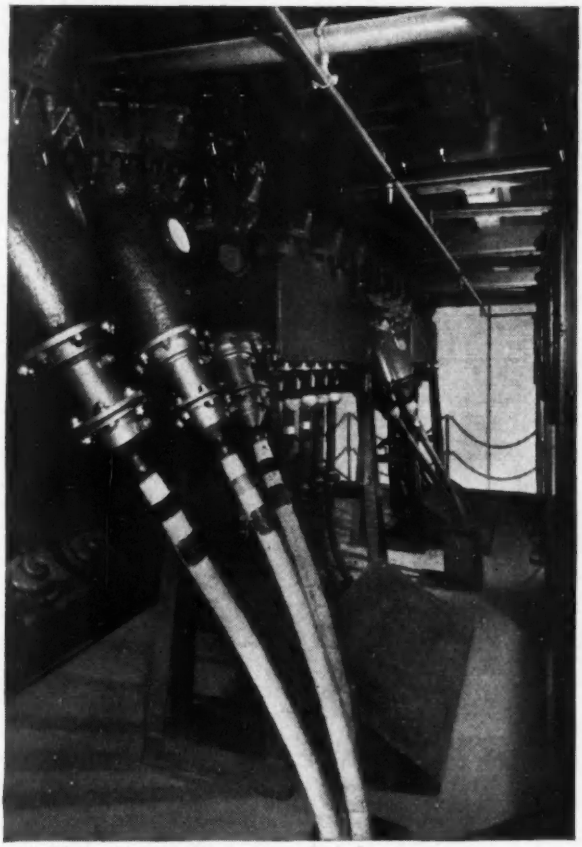
MEDIUM VOLTAGE

CUBICLE SWITCHGEAR

For service up to 5000 amps at 600 Volts

MUDIE'S ELECTRICAL CO., LTD., BIRMINGHAM 28

ONE SURE FACT ABOUT CABLES



Oil-filled cables terminating into Switchgear

IF

you need cables
of any type,
in any quantities,
for any installation,
be sure of *one* thing:
if you choose to deal
with any firm listed
below you will
know for certain
that the standards
of design
and quality are
the highest possible,
because they are
standards set,
rigorously kept and
constantly reviewed
by C.M.A.

AND ONE OF THE MANY FACETS OF CABLE MAKING

C·M·A

MEMBERS OF THE C.M.A. & AFFILIATED MANUFACTURERS ASSOCIATIONS

British Insulated Callender's Cables Ltd.
Connollys (Blackley) Ltd
The Craigpark Electric Cable Co. Ltd.
Crompton Parkinson Ltd.
Enfield Cables Ltd.
The Edison Swan Electric Co. Ltd.
Greengate & Irwell Rubber Co. Ltd.
W. T. Glover & Company, Ltd.
W. T. Henley's Telegraph Works Co. Ltd.
Johnson & Phillips Ltd.
Liverpool Electric Cable Co. Ltd.
Metropolitan Electric Cable & Construction Company Ltd.
Pirelli-General Cable Works Ltd.
(The General Electric Co. Ltd.)
Siemens Brothers & Co. Ltd.
(Siemens Electric Lamp & Supplies Ltd.)
St. Helens Cable & Rubber Co. Ltd.
Standard Telephones & Cables Ltd.
The Telegraph Construction and Maintenance Co. Ltd.

CABLE MAKERS ASSOCIATION, 52/54 HIGH HOLBORN, LONDON, W.C.1. TEL: HOLBORN 7633.

Hotting it up...

BRIGHTRAY C is for electric fires, cookers, etc. (maximum operating temperature 1,150° C.)

BRIGHTRAY S is for electric furnace elements (maximum operating temperature 1,150° C.)

BRIGHTRAY F is for electric furnace elements in special atmospheres only (maximum operating temperature 1,000° C.)

BRIGHTRAY B is for convectors, toasters, etc. (maximum operating temperature 950° C.)

"Brightray" is a registered trade mark

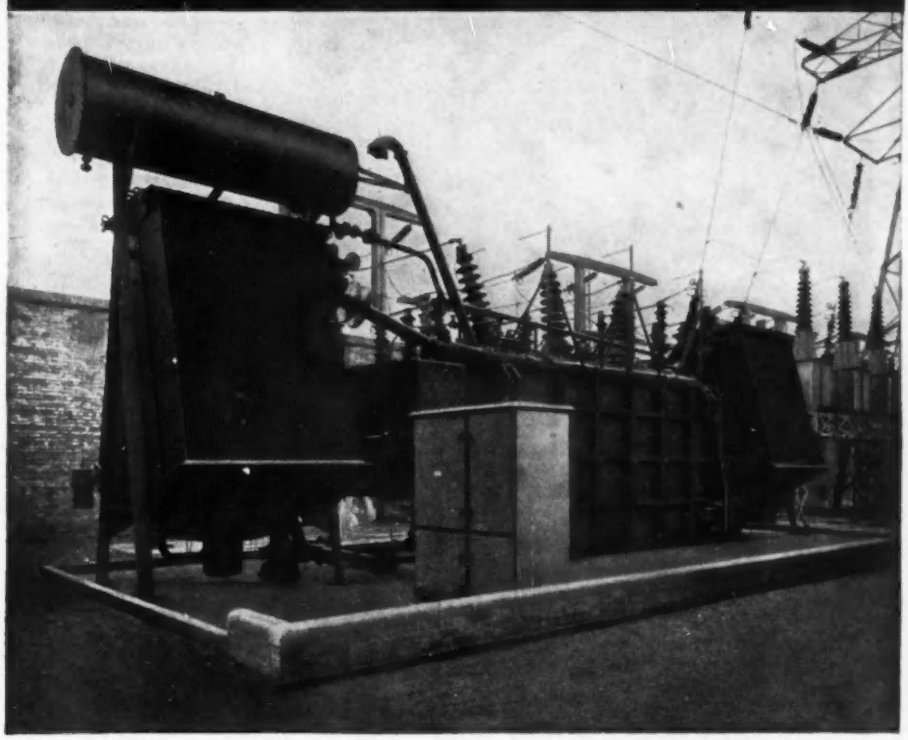
HENRY WIGGIN

We would not supply Brightray for this sort of job. For its proper purpose, electrical heating, we produce several different grades each suited to different conditions of service. The demand is so great that although we are making larger quantities of Brightray, we are not always able to satisfy customers' needs immediately.

However, like Brightray itself, we are doing our best in difficult circumstances.

HENRY WIGGIN & COMPANY LTD · WIGGIN STREET · BIRMINGHAM · 16

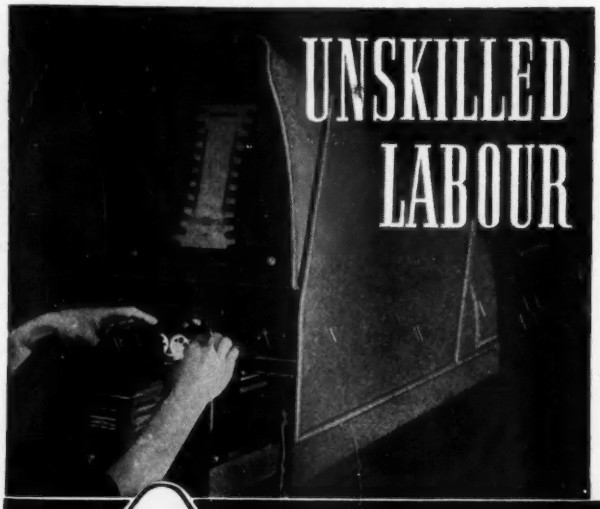
TRANSFORMERS



A 45,000 kVA, 132/33 kV transformer fitted with 132 kV on-load tap changer at the Newport outdoor substation of the B.E.A.

by G.E.C.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2



Unskilled labour may be safely employed to check rapidly and with absolute accuracy the profile, dimensions and tolerances of small machined parts on the Newton Profile Projector.

Completely obviates the necessity for complicated and costly gauges and reliance on the "sense of touch" demanded by their use.

Daylight Operation.

STAND No. 121
British Instrument Industries Exhibition

Newton

Dept. W47 NEWTON & CO. LTD., 72 Wigmore Street, London, W.1
Associated with Metropolitan-Vickers Electrical Co. Ltd.
(A member of the A.E.I. group of companies)

NEW IRONCLAD
SWITCH ASSEMBLIES
5 and 15 amp. 1, 2, 3, 4 and 6 way

Send for list.
WILLIAM **McGEOCH** & CO. LTD
BORDESLEY, BIRMINGHAM 10
Telephone: VIC. 2174
28 WEST CAMPBELL ST., GLASGOW, C.2
Telephone: CEN. 7041
43 BERNERS ST., LONDON, W.1
Telephone: MUS. 6676
26 ELDON SQ., NEWCASTLE-ON-TYNE
Telephone: 27669.

An indispensable record of arrival and departures, an automatic and accurate statement of hours worked, and a filed index of wage rates, overtime and other man-hour statistics for the efficient planning of industry. You can get all this on the Gledhill-Brook Recorder.

GLEDHILL-BROOK
TIME RECORDERS
and Costing Systems

Enquiries to:
GLEDHILL-BROOK TIME RECORDERS LTD.
60, Empire Works - - Huddersfield

To Electricity Authorities Everywhere

WHERE RIPPLE CONTROL AND THE USE OF DEVICES WHICH TAKE ADVANTAGE OF THE LOWERING OF FREQUENCY AND VOLTAGE TO SHED LOAD DIFFER

1. **Ripple control gives the engineer complete selective control of the load to be shed.**
2. **Ripple control is positive signalling, transmitted only as and when required.**
3. **Ripple control has permanent investment value because it can be used for improvement of the load factor, under all conditions of electrical supply and demand.**
4. **Ripple control besides being invaluable under peak load conditions, also provides facilities for controlling other services, e.g. street lighting.**

RYTHMATIC
RIPPLE CONTROL
EQUIPMENT

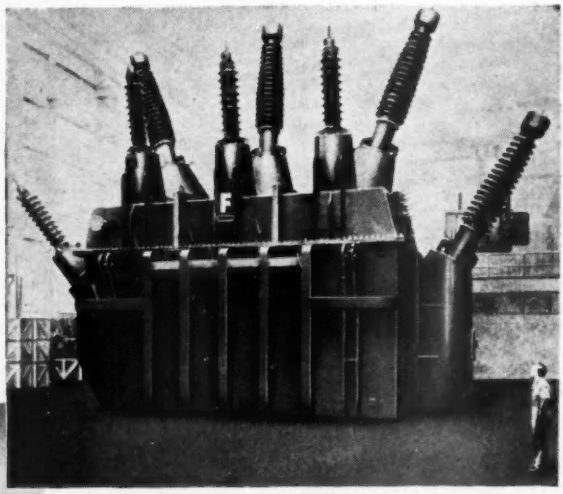
For further information write:

AUTOMATIC TELEPHONE & ELECTRIC CO. LTD.

STROWGER HOUSE, ARUNDEL STREET, LONDON W.C.2.
STROWGER WORKS, LIVERPOOL 7

MANUFACTURERS OF
"RYTHMATIC" RIPPLE CONTROL EQUIPMENT

A.3662-C.23



CENTRE :
The Transformer in special transport casing leaving the factory at Hollinwood.

BOTTOM :
The service tank is loaded at the docks.

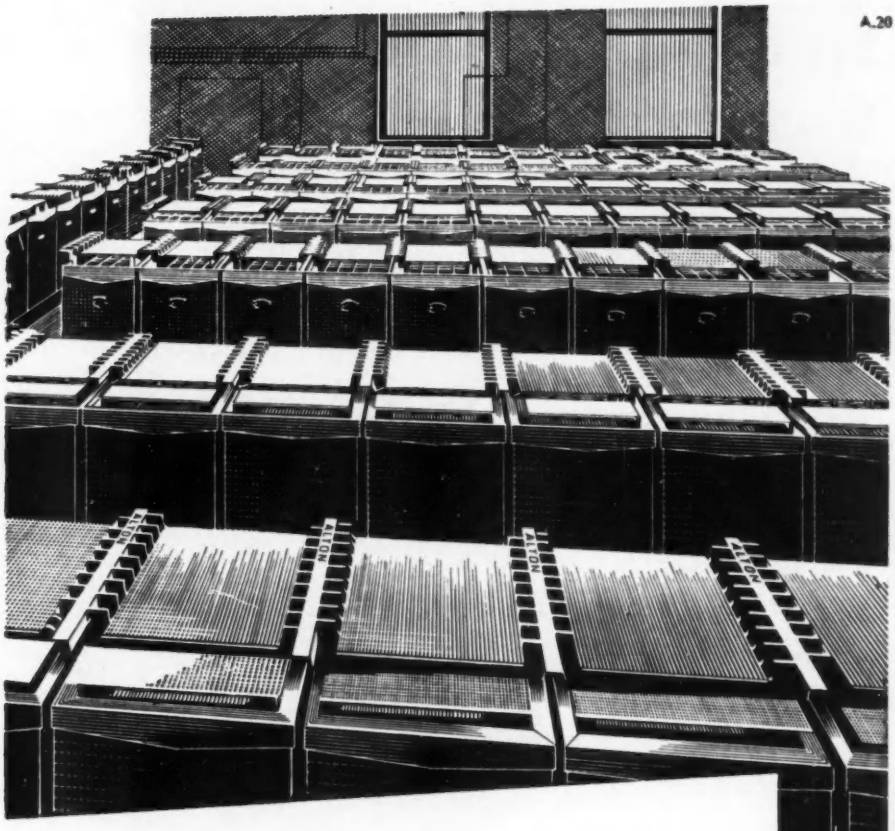
A 230 kV, 3 - phase, 64 MVA FERRANTI TRANSFORMER LEAVES FOR SERVICE OVERSEAS

The transport limitation on this contract necessitated shipment of the core and windings of the Transformer in a special transport casing. The service tank was shipped separately.

FERRANTI

FERRANTI LTD
HOLLINWOOD LANCS
London Office :
KERN HOUSE · KINGSWAY · W.C.2

A.20



Alton has been exporting batteries for thirty years. In installations in sixty-five countries Alton Batteries, in capacities from 10 to 15,000 ampere-hours, are giving the service only good batteries can give. Alton, in any language, means good batteries and firm delivery dates.

ALTON

BATTERIES OF MERIT

THE ALTON BATTERY COMPANY LTD
Alton, Hants: Telephone: Alton 2267 and 2268
Telegrams: Battery, Alton

Alton can also supply renewal plates for all makes of battery, British & Continental

S.P. Transformer Bushings

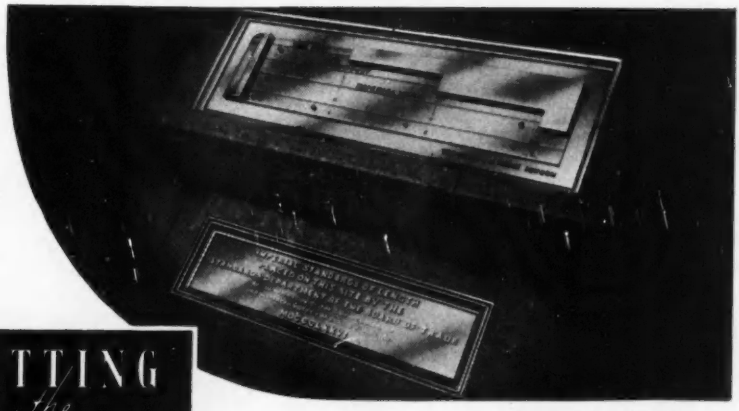
A recent addition to the range – **TYPE A-4.** working voltage 600-1,000 volts current ratings 150, 350 and 500 amps.

The S.P. range includes bushings for all voltages up to 88kV and current ratings up to 1500 amps. Write for Catalogue No. 21.

STEATITE & PORCELAIN PRODUCTS LIMITED

Stourport on Severn, Worcestershire. Phone : Stourport 111. Grams : Steatain, Stourport.

SP. 46



Imperial Standards of Length
— Trafalgar Square, London

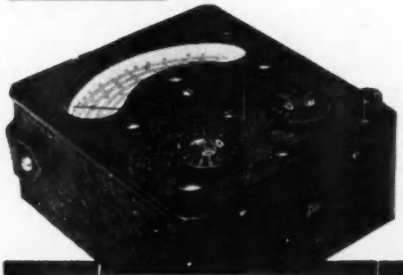
SETTING *the* STANDARD

In every branch of industry, in laboratories and scientific research establishments, in the services and, in fact, wherever electrical maintenance and measurement are of prime importance, "AVO" Electrical Testing Instruments maintain a reputation unexcelled for robustness and dependable accuracy. They are frequently used as a standard by which other instruments are judged.

See our Exhibit at the BRITISH INSTRUMENT INDUSTRIES EXHIBITION

Stand No. 118

OLYMPIA
July 4—14



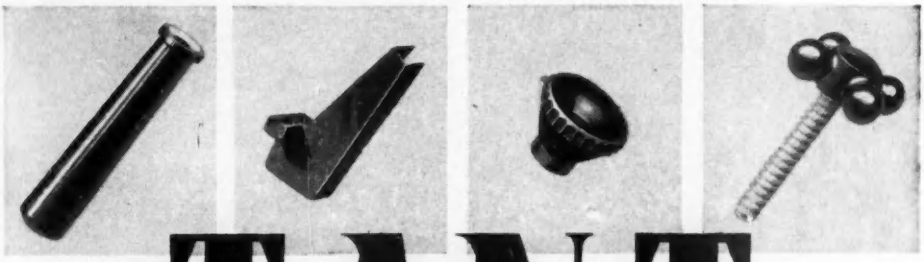
The Model 7 Universa Avometer is a typical example of a modern "AVO" multi-range meter. It is a combination AC/DC instrument providing on a 5-inch hand calibrated scale 50 ranges of readings of Current, Voltage, Resistance, Capacitance, Power Output and Decibels. The total resistance of the instrument is 500,000 ohms, and its small power consumption and precision accuracy make it the choice of radio, television and electrical engineers throughout the world.

Write for a FREE copy of the Comprehensive Guide to "Avo" Instruments.

THE STANDARD OF *Dependable* ACCURACY

AVO
REG. TRADE MARK
ELECTRICAL TESTING INSTRUMENTS

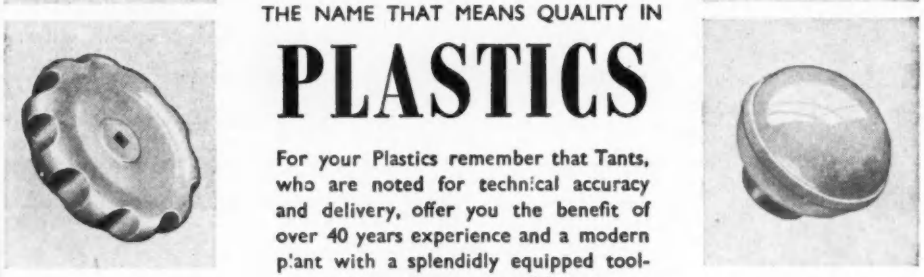
THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.
WINDER HOUSE · DOUGLAS STREET · LONDON · S.W.1 *Telephone: VICTORIA 3404/9*



TANT

THE NAME THAT MEANS QUALITY IN

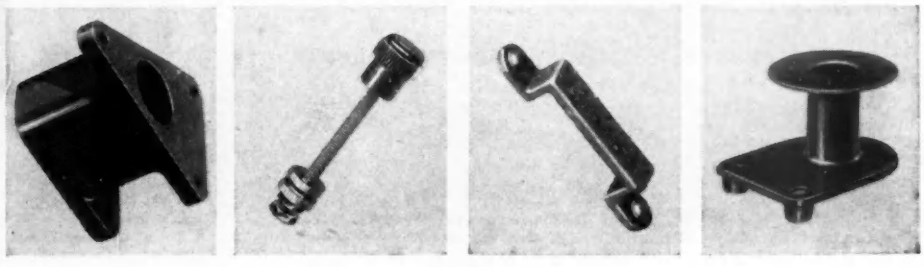
PLASTICS



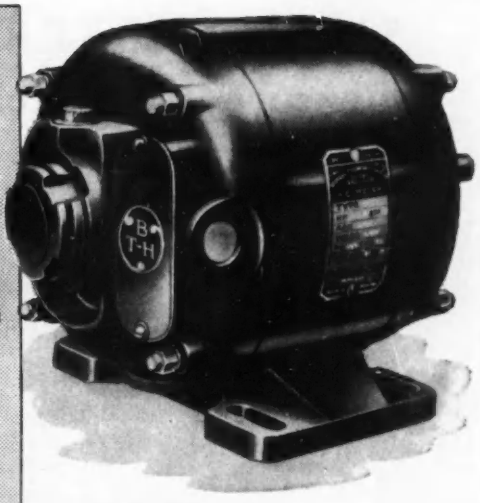
For your Plastics remember that Tants, who are noted for technical accuracy and delivery, offer you the benefit of over 40 years experience and a modern plant with a splendidly equipped tool-room. No subject or problem is too difficult for them.

W. H. TANT & CO. LTD.
PIONEER PLASTIC HOUSE
TRANSANT WORKS, DOLLMAN STREET,
BIRMINGHAM 7

Telephone: ASTON CROSS 3232/3
Telegrams: "TANTAMOUNT B'HAM"



Fractional Horsepower Motors



Up to 1 H.P. for A.C. (single or polyphase) and D.C. supply circuits

BTH fractional horsepower motors are second to none in quality and proved performance. All types are available in sizes to meet every domestic, commercial, and industrial need. Precision-built of highest grade components, and fully tested, they will give long and trouble-free service. Little attention is necessary beyond an occasional spot of oil, and this only when sleeve-bearings are preferred to grease-packed ball-bearings. Flameproof motors and slow-speed geared-units also available.

No manufacturer can offer a wider choice in fractional horsepower motors. Whatever the conditions of service or type of drive, there is a BTH motor well suited to the job.

THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED RUGBY ENGLAND
Member of the AEI group of companies

A-4043

SMITH METERS
measure accurately

Accuracy is inherent in all Smith Meters: it is built in by correct design and sturdy construction. No other meter incorporates all these features:

Compensation for temperature fluctuation.
Single laminated construction.
Sound scientific design of driving element.
Voltage flux by-pass.
Perfect graph curve at all loads.

Specify SMITH METERS

SMITH METERS LTD · ROWAN ROAD · STREATHAM VALE · LONDON S.W.16
also in LEEDS and DUNBLANE, PERTHSHIRE

ELECTRICAL TIMES

Vol. 120 No. 3113 THURSDAY 5 JULY, 1951

PUBLISHED EVERY THURSDAY

SIXTIETH YEAR OF PUBLICATION

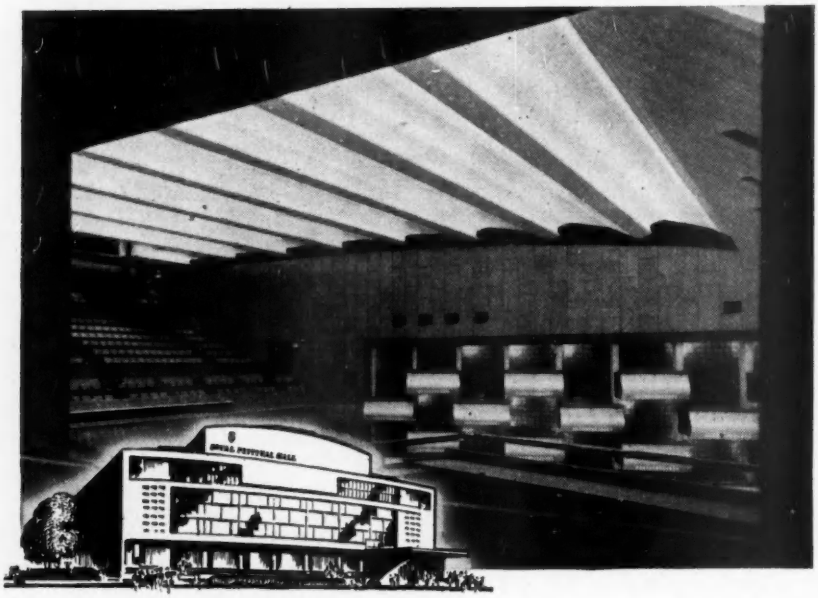
SKELTON GRANGE POWER STATION PHOTOGRAPH 3
PIPE LINE CORROSION, *by Comdr. G. G. Portch, R.D., R.N.R., Assoc.I.E.E.*.. .. 4
OUR READERS' VIEWS 11
INFRA-RED DECOMPOUNDING 12
THE EDISON GROUP 12
BRITISH INSTRUMENTS 13
PROBLEMS AND PRACTICE IN ENGINEERING 17
RECTIFIER-CONTROLLED VARIABLE SPEED DRIVES *by C. Beveridge, A.M.I.E.E.* .. 19
ELECTRICITY PRODUCTION ANALYSED 20
P.T. STILL HAMPERS ELECTRIC VEHICLES 21
COOKERS IN FRANCE, *by Mrs. May Pearce* 22
BRITISH STANDARDS 24
AIDING AGRICULTURE 25
OVERSEAS NEWS 28
PERSONALITIES IN THE INDUSTRY 30
NEW LITERATURE 32
RECENT RESEARCH REPORTS 33
THE BUYER'S COLUMN 35
METAL-CLAD SWITCHGEAR 37
THE WEEK IN NEWS 38
Questions in Parliament 42
Electric Supply News 43
Company Activities 44
COMMERCIAL INFORMATION 45
CLASSIFIED ADVERTISEMENTS 55
INDEX TO ADVERTISERS 64

SUBSCRIPTION RATES.—United Kingdom and Overseas £2 10s. 0d. per annum. Canada C$7·50, U.S.A. $7·50 per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies 9d. each.

OFFICES — SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telephone-HOLborn 6016 Telegrams-Equivolt, Estrand, London

FESTIVAL OF BRITAIN

ROYAL FESTIVAL HALL



Auditorium permanently lighted by G.E.C.

It is the Royal Festival Hall, the only permanent building on the site, that will carry proud memories of the South Bank Exhibition ; and it is a source of pride to the G.E.C. that for the auditorium the Chief Engineer's Department of the London County Council should have appointed the Company to collaborate in the design of the lighting installation as well as the supply of the equipment.

The Company's equipment was also used for the exterior lighting of a quarter of the exhibition grounds which included the Homes and Gardens section as well as the fountains and lakes which employed over 800 G.E.C. floodlights.

OSRAM lamps are installed throughout the Royal Festival Hall—foyer and auditorium—and elsewhere in the exhibition.

Electrical contractors for the Royal Festival Hall:
Berkeley Electrical Engineering Co. Ltd.

THE GENERAL ELECTRIC CO., LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Editorial

E.V.A. AND PURCHASE TAX

REVIEWING the advantages of the electric vehicle at the E.V.A. lunch last week, the Minister of Supply paid tribute to its minor points—safety and absence of noise and fumes. He completely overlooked, however, the characteristic which is of outstanding importance and which was so strongly emphasised by Mr. Rochs, the chairman, that the electric vehicle in 1950 saved 16,000,000 gallons of petrol which, if drawn from hard-currency sources would have cost us $2\frac{1}{2}$ million. This important contribution to the national economy is rewarded by the imposition of purchase tax on a scale which makes the tax payable on an electric vehicle appreciably more than the corresponding figure for an equivalent petrol-driven van. What seems to cause the E.V.A. most frustration is that the Chancellor will neither remit the tax nor give a reason for not doing so. One would have expected an ex-Minister of Fuel to lend a sympathetic ear to his old industry—not from sentiment, but from a real knowledge of its problems, not the least of which is the potential advantage to the B.E.A. of large off-peak loads. With the present uncertainty of the Persian oil situation it seems that if ever the electric vehicle deserved encouragement the time is the present.

INSTRUMENTS FOR INDUSTRY

ANOTHER exhibition added to the electrical industry's crowded summer calendar must be regarded with mixed feelings, both by manufacturers invited to display their products and by engineers who wish to keep informed of the latest developments in design. What then, is to be the decision on the British Instrument Industries' Exhibition? The test must be its ability to add to the field already covered effectively, and here it appears at first sight to overlap the range annually reviewed at the Physical Society's Exhibition, S.I.M.A. symposium exhibition, and some similar shows. Closer examination, however, reveals some important differences of accent that make the new venture acceptable and useful: it seeks to survey generally what is available, rather than only what is newly in the market and to consider industry in its essential job of producing and selling rather than in its ancillary tasks of researching, developing and testing. Results of this difference of accent are apparent in the lower proportion of electronic instruments, in the greater variety of cases and mountings shown and, of course, in the list of firms exhibiting. If the exhibition proves the success that *Meteor* hopes it will, the Physical Society Exhibition, and others, will benefit indirectly, for there will be less pressure to use these as a shop window for instruments of primarily industrial importance. They can then carry out more efficiently their proper task of providing a meeting place between the instrument designer and the scientist and research engineer who needs his assistance.

CORROSION PROTECTION

CATHODIC protection and, indeed, electrolysis in general, is a subject upon which little seems to have been published, in this country at least. It is one of those subjects which, like earthing, or lightning conductors, is taken for granted and only seriously investigated in detail when the problem is immediate. It was, for example, only just before the war that a new housing estate caused a ferment by the consequences of fitting galvanised hot-water cisterns with copper pipes, and the rule-of-thumb remedy for most corrosion troubles has not changed much since Davy fitted sacrificial zincs to copper-sheathed ships more than a hundred years ago. The advent of the metal rectifier provided a convenient means of obtaining a static

source of low voltage d.c. for inhibiting electrolysis. It has been applied for some time in the U.S., an interesting example being the protection of cable sheaths in the underground network of Chicago, where sheath corrosion was previously causing several failures a year and has provided a complete cure in many instances. The constant-current circuit, described in our leading article this week is, however, a British development and represents a considerable advance in the technique of the protection of all types of buried structures.

CORROSION CONSULTANTS

QUITE apart from the constant-current system, however, a very wide field is open to the rectifier for anti-electrolytic protection. Corrosion troubles on certain water-cooled coils of heat transfer units have now been satisfactorily overcome, and the heat transfer has actually been improved due to the elimination of protective painting hitherto found necessary. It seems, however, that the field—wide though it is—does not offer any glittering financial rewards, because it is one in which the manufacturer sells a pound's worth of engineering with a pennyworth of materials. Similar conditions obtain in the sphere of radio interference suppression, where days spent in tracking down troubles often result in the sale of a few small capacitors. The remedy seems to be to charge consulting fees, based on the magnitude of the task. Otherwise, unless the customer is far-sighted enough to regard the cure of his troubles as an item in the balance sheet, he is apt to feel that he is not getting value for his money.

LIFE COSTS MONEY

DESIGNING for a given life has its attractions as an economy measure, but disadvantages may result when a change of plan is made outside engineering control. The immediate case in point is the Festival Pleasure Gardens which, it is now suggested, may be kept open for another year or more. To consider only the electrical installation there, such an extension may prove expensive in maintenance necessary to keep a temporary system running efficiently and safely. As was pointed out in the ELECTRICAL TIMES of May 10, the electrical arrangements were made with a limited life of six months in mind. To quote the consulting engineers "it was decided that tough rubber sheathed cable would stand such conditions," and this form of construction was a more practical proposition in the limited time available, than a fully waterproof system. It is to be hoped that the present management has such factors clearly in mind in making recommendations to the Minister.

Meteor

THIS WEEK'S PHOTO

SKELTON GRANGE is the first power station to be commissioned in Yorkshire since vesting date. The station was designed by Merz and McLellan on instructions from the Leeds Corporation Electricity Department, and Sir Alexander Gibb and Partners were responsible for the civil work. The plant has an ultimate capacity of 360 MW, comprising six Parson's turbo-alternators, each of 60 MW capacity, six 360 k lb/hr and three 550 k lb/hr International Combustion boilers. The furnaces are corner fired by tilting burners. The steam conditions at the turbine stop valve are 900 lb/sq in. at 925° F. There are five stages of feed heating, giving a final feed temperature of 385° F. The hydrogen cooled alternators generate at 11 kV, and step up to 132 kV. All the main switching is done at the grid substation at the latter voltage. The British Thomson-Houston Co. supplied the main switchgear and control panels, and the English Electric Co. the auxiliary switchgear, the main board of which operates at 3,300 V.

Circulating water is drawn from the River Aire, and pumped to the condensers via a bus-main running the length of the turbine house. In order to supplement the river flow, transfer pumps are situated two miles below the circulating water outlet, in order to pump the river water, plus the Leeds sewage effluent, into the canal, from which it flows via a spillway back into the river above the circulating water inlet. To further augment a supply of cooling water, towers will be used during dry weather. Much of the fuel will come from Rothwell Pit, only two miles away.

The first set was synchronised on April 30 and went on to commercial load on May 16, following various commissioning tests. It is hoped that three turbo-alternators, completing the first half of the station, will be in commission before the end of the year.

ELECTRICAL TIMES POWER STATION SERIES
No. 73. Skelton Grange.

PIPE LINE CORROSION

Developments in Constant-Current Cathodic Protection for Buried Metal Structures

By Comdr. G. G. PORTCH, R.D., R.N.R., Assoc. I.E.E.*

ALTHOUGH the use of Cathodic Protection against the corrosion of pipe lines and buried steel structures has been steadily increasing during the last 20-25 years in the United States, this form of protection is still relatively unknown in Great Britain. However, before discussing methods of preventing corrosion, it will be useful to consider very briefly, the causes and processes of corrosive action.

It is generally agreed that corrosion can be defined as "the destruction of a metal by chemical or electro-chemical reaction with its environment," and, therefore, broadly falls into two separate categories :—

(*a*) Chemical corrosion, or the dissolving of the metal by the salts of various elements frequently found in the soil or the medium surrounding the buried structure, and in intimate contact with it. This action generally prepares the way for:—

(*b*) Galvanic (or electrical) action by which the metal is disintegrated owing to the passing, either of galvanic currents set up by the structure itself, or stray electric currents that may have been picked up from the surrounding soil.

History of Electrolysis

It was the Italian physicist Alessandro Volta (1745-1827) who found that when two rods of dissimilar metals are partially immersed in a conducting liquid, an electric current will flow through the liquid from one to the other, when their upper ends were joined. If the upper ends of these rods are not connected together, then no current would flow, and he pointed out that what really happened in Galvani's famous frog's-legs demonstration was that the pickling solution in the frog's body acted in the same manner as the liquid he himself used.

It was then found that a current would flow (a) if a combination of two different metals, each in different solutions, were used; (b) if two rods of the same metal were placed in different solutions, or even (c) if two rods of the same metal were placed in similar solutions, but of different concentrations. In order to carry out the experiment with two different solutions, two containers can be used, connected together by a tube below the level of the liquids. A porous membrane inserted in this tube keeps the solutions from actually mixing, but will allow current to pass unhindered.

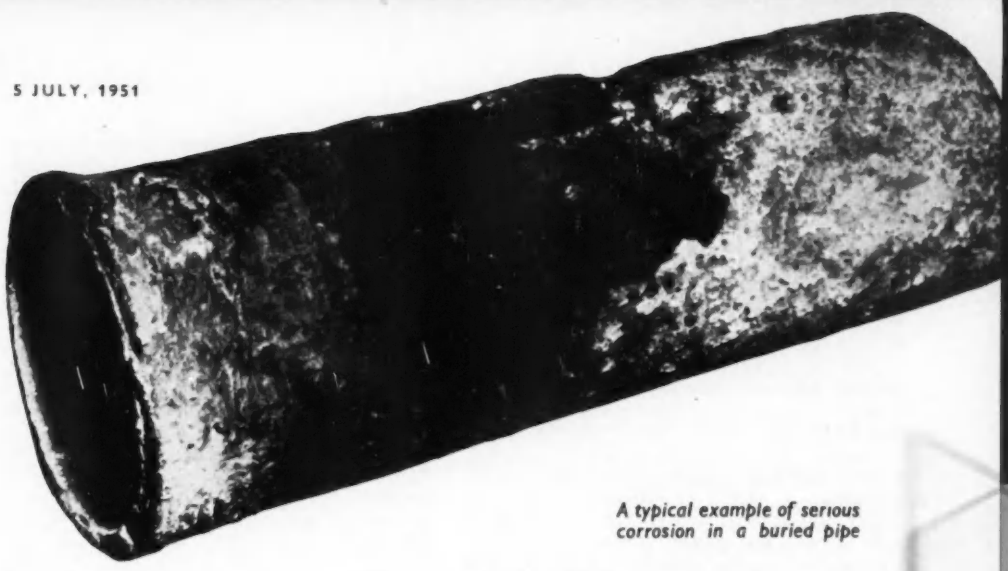
These latter experiments (b) and (c) are, of course, basically the problem met by long pipelines. The actual pipe-line corresponds to rods of identical metal, and the varying soil conditions through which the pipe passes correspond to the two solutions of different concentrations and possibily different compositions.

The next discovery of interest to the modern corrosion engineer was that of Nicholson and Carlisle, who, in 1800, found that by placing two platinum wires in water and passing a direct current (generated by a Voltaic pile) between them, hydrogen gas bubbles were evolved at the negative wire and oxygen at the positive wire. The water was thus decomposed into its two elements, and the theory of electrolysis was developed.

Shortly afterwards Cruickshank (1745-1800) showed that metallic salts in solution could be decomposed in the same way. He was also probably the first to notice that with certain liquids it was possible to obtain a concentration of acid surrounding the positive rod and a concentration of alkali surrounding the negative rod.

Sir Humphrey Davy, also did considerable work on corrosion. About 1823 at the request of the Admiralty, who were having trouble with corrosion of under-water copper sheathing of wooden ships hulls, he carried out experiments by fitting zinc plates to the sheathing, which had the effect of rendering the copper electrically negative. This was tested in several vessels, but it was found that although the copper sheathing was protected from corroding, the ships' bottoms now became exceedingly foul from seaweed and shellfish, and the scheme was abandoned. However, it is interesting to note that the practice of fitting zinc plates to the stern posts of vessels has been general for a large number of years. These counter the corrosive effects set up between the propeller

* Westinghouse Brake and Signal Co., Ltd.



A typical example of serious corrosion in a buried pipe

and the ship's hull with the sea as the conducting liquid. These zincs get very badly pitted and are generally renewed when the vessel goes into dry dock.

Michael Faraday (1791-1867) was the first to give the term "Electrolyte" to the solution which, as current is passed through, decomposes. The poles or terminals placed in the electrolyte he referred to as "electrodes", calling the negative electrode the "Cathode" and the positive electrode the "Anode". He showed that an electric current passing through an electrolyte is conveyed or transported through the liquid by moving particles consisting of electrically charged atoms or groups of atoms. These Faraday called "ions"—the travellers—from the Greek verb meaning "to go." Negatively-charged ions travelling towards the positive pole or anode, were later called anions, and positively-charged ions which travel towards the negative pole or cathode, cations.

Chemical Equivalents

In 1824 Faraday discovered the laws which govern the principles of electrolysis and stated that :—

(1) The amount of chemical action is proportional to the amount of electricity passed through the electrolyte.
(2) The weight of ions liberated or deposited by the same quantity of electricity are in proportion to their chemical equivalents.

Chemical Equivalent can be briefly described as the weight of a substance deposited by a certain quantity of electricity as compared with the weight of hydrogen which would be deposited by the same quantity of electricity. The Potential Series of metals, or Electro-Chemical Series, comprises a list of metals arranged in order of their potential differences generally expressed with respect to hydrogen as a base. It will be noticed that those metals with a positive potential with respect to hydrogen are referred to as "Noble" while those with negative potentials are referred to as "Base" metals. Table 1 shows approximate values for those more commonly met.

TABLE I. TABLE OF POTENTIALS

NOBLE METALS	
Gold	+1·4 V
Platinum	+1·2 V
Silver	+0·8 V
Copper	+0·34 V
Hydrogen	0·00 V
BASE METALS	
Lead	−0·13 V
Tin	−0·14 V
Nickel	−0·25 V
Cadmium	−0·4 V
Iron	−0·44 V
Chromium	−0·7 V
Zinc	−0·76 V
Aluminium	−1·34 V
Magnesium	−1·8 V

Theory of Corrosion

A consideration of the electro-chemical processes which occur in a primary battery will assist in examining the theory of corrosion. Consider a galvanic cell as shown in Fig 1, with an electrolyte consisting of a solution of sodium chloride (common salt) in water. As soon as the zinc electrode and the copper electrode are joined by the external shorting link current will begin to flow, and the zinc is dissolved by being taken into solution as zinc

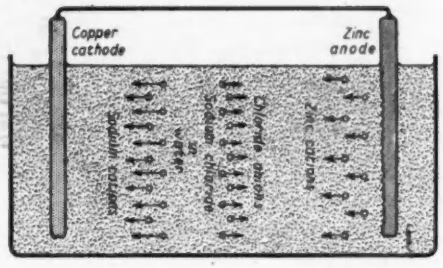


Fig. 1. Migration of ions in a simple cell

cations which are attracted toward the copper cathode.

The sodium chloride of the electrolyte is split up into (a) sodium cations which travel towards the copper cathode and (b) chloride anions, which on reaching the anode combine with the zinc to form zinc chloride which, being soluble immediately dissolves in the electrolyte thus building up a concentration of zinc chloride solution around the dissolving anode.

In a similar way the sodium cations, having reached the cathode, with the water of the

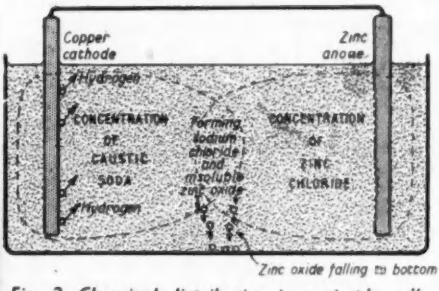


Fig. 2. Chemical distribution in a simple cell

electrolyte to form caustic soda (sodium hydroxide) and hydrogen.

$$Na + H_2O \rightarrow NaOH + H$$

The hydrogen may remain at the surface of the cathode and tend to polarise the cell or it may bubble away to atmosphere, or if there is any free oxygen or oxidising agent present in the electrolyte the hydrogen will be removed by combining with the oxygen to form water. (Fig 2).

Thus at the cathode there is a formation of sodium hydroxide and water which spreads out in the elctrolyte and eventually meets the zinc chloride concentration surrounding the anode. Where these two solutions meet, chemical action results in the formation of sodium chloride again and zinc oxide, the latter being relatively insoluble and, therefore, precipitated somewhere between the electrodes. The final result is the dissolving away of the zinc anode, the evolution of hydrogen at the cathode, and a precipitation of insoluble oxides somewhere between the two electrodes; in other words, "corrosion."

In the case of cells having an iron electrode, the results are similar, the iron anode being dissolved and precipitated in various forms of insoluble iron oxides, commonly called rust, while hydrogen is evolved at the cathode.

Corrosion of Pipes

Consider the case of a galvanised iron pipe in which a pin-hole has been left in the zinc galvanising. Moisture will inevitably collect in this pin-hole and will form the electrolyte. A galvanic current will now pass from the zinc through the moisture to the iron, returning through the metallic junction of the iron and zinc. As already shown, current passing out of the zinc will cause it to dissolve making the pin-hole progressively larger, although the iron will not have been affected as the result of the current passing into it. When, however, the hole in the zinc has become so large that the zinc-iron galvanic currents operating around the rim of the hole do not reach the centre, the iron in this part will cease to be protected. It is itself now open to a galvanic attack in conjunction with any other unprotected portions of iron that may exist farther along the pipe, the soil with its various concentrations of salts acting as the electrolyte. Thus there are several different galvanic currents operating at the same time.

As most large buried metal pipe-lines consist of consecutive sections of a metal joined together passing through soil containing various salts in various concentrations, this problem, as already mentioned, is really the same as that of a galvanic cell consisting of two electrodes of the same metal dipped in solutions of different concentrations or compositions and joined together externally by a shorting link of the same metal (Fig. 3).

Galvanic currents will pass out of the pipe into a soil which has a high salt concentration and consequently low ohmic resistance, travelling through the soil (as the electrolyte), to re-enter the pipe in areas where the soil has a

* Considerable confusion can often be caused by the positive and negative signs shown in the Table of Potentials. Zinc is shown as negative, while copper is shown as positive with reference to hydrogen, yet in a cell employing these two metals the zinc is the anode or positive electrode, and the copper the cathode or negative electrode. It is important to distinguish flow *inside* the cell (through the electrolyte) and *outside* the cell (by an external conductor).

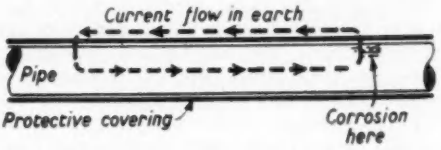


Fig. 3. Diagram showing cell action of a single pipe

lower salt concentration and higher ohmic resistance. The circuit is completed by the current returning in the pipe itself. Soils of varying pH values will also have similar effects. As is generally known, pH value is a convenient method of expressing the degree of acidity or alkalinity of a solution, based on hydrogen ion concentration and expressed by a scale ranging from pH0 to pH14, each succeeding unit of pH value representing a tenfold decrease in hydrogen ion concentration. pH0 corresponds to extreme acidity; pH7 is a strictly neutral solution and pH14 extreme alkalinity; average tap water which is of the order of pH7·5 approx. is nearly a neutral solution.

Returning to the Table of Potentials above, the figures given there can be altered by the pH value of the solutions in which they happen to be immersed. For example, zinc is shown in the Table as −0·75 V and iron as −0·44 V, so that the potential difference is approximately 0·32 volts. It is considered by some authorities that this figure can vary from approximately −0·4 at pH0 (absolute acidity) to −0·5 V at pH7 and −1·2 volts at pH14 which represents absolute alkalinity.

Cathodic Protection

It will be appreciated that wherever current passes out from the metal into the electrolyte, corrosion will occur, the amount of metal dissolved being in direct proportion to the amount of current flowing. If, therefore, a current from an outside source could be passed through the electrolyte or soil into the metal, it will help to neutralise the galvanic currents passing out of the metal into the soil and thus hinder corrosion. However, if this incoming current is powerful enough to counter-balance the galvanic currents completely, then corrosion will not occur. This in effect is the broad principle of cathodic protection and can be accomplished by two different methods.

Sacrificial Anodes

The first method is to bury a number of anodes of a suitable metal close to the structure to be protected. Supposing the structure itself to be built of iron, it will be noted from the Table of Potentials that the difference of potential between this metal and either zinc 0·32 volts, aluminium 0·9 volts or magnesium 1·1 volts, is sufficient to cause current to flow. A galvanic cell is thus formed, consisting of two dissimilar metals and an electrolyte when the two electrodes are joined by a shorting wire, the iron being the cathode and the zinc, aluminium or magnesium, the anode which dissolves away in proportion to the amount of current passing.

Magnesium is the more generally used for this purpose, but as the voltage available is only 1·1 volts it will be apparent that it is very difficult to force current of sufficient magnitude through soils of high resistance. The general practice is to bury magnesium anodes, which are usually supplied in units weighing about 22 lb each, at a distance of about 10 feet from the structure and to incorporate a detachable link in the wire joining the two together. This link can be replaced, as required, by a resistance to limit the amount of current passed by the anode and thus increase its life.

The number of these anodes required to protect a given length of pipe-line depends entirely on the local soil conditions and also on the amount of current required to afford protection. Obviously such methods have limitations, and in localities where an a.c. supply exists the second method is more satisfactory.

Use of D.C.

This consists of the employment of a battery, motor generator set or a transformer and rectifier, to supply d.c. which is fed into a

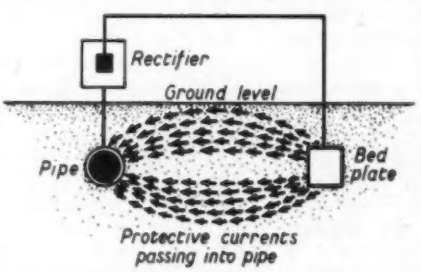
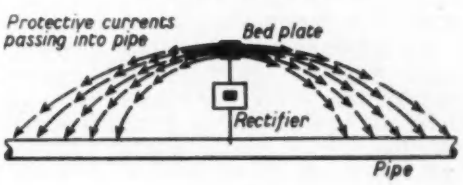


Fig 4. Section (above) and plan (below) of rectifier protection for pipes



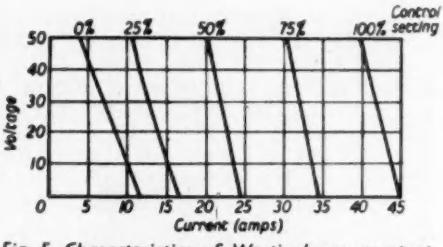


Fig. 5. Characteristics of Westinghouse constant-current circuit for pipe line protection. (Note. Control is continuous over the range of—100%)

sacrificial bedplate made up for example, of scrap iron and buried in the soil at any desired distance from the structure to be protected. Current is passed by a cable from the d.c. supply to the bedplate where it diffuses into the soil. Passing through the soil the current enters the structure at all places where the metal is exposed, finally returning to the source by another cable from the structure, thus completing the curcuit (Fig. 4). As the current is passed out from the bedplate into the soil it is the sacrificial bedplate which is corroded away or dissolved while the structure is protected. In obedience to Faraday's Laws the rate of dissolution of the bedplate is in direct proportion to the amount of current passed.

The general practice is to employ transformer rectifiers to supply power to the bedplate. Batteries and motor generators are not so satisfactory because of maintenance problems, although in localities where a.c. power is not available and where the soil is of fairly high resistance a motor generator set is generally more effective than a large number of magnesium anodes.

In remote districts of the United States where a.c. power is not available, wind electric generators have been in use for some 12 years. In some cases these are used to supply power direct to the sacrificial plates and in others to charge nickel-iron batteries which in turn feed the bedplates. Recently a combination of wind generator and magnesium anodes has been used, it being estimated that in such areas there is enough wind for 80% of the year to generate sufficient power to supply adequate protection.

Current Regulation

All these methods of affording protection suffer from the same great disadvantage. Should there be any variation in the soil resistance between the buried anode and the structure, then the amount of protective current will vary as well. In the case of a heavy rain storm the soil resistance will be lowered with a corresponding increase of current flowing into the structure. This will not only overprotect the pipe-line, causing excessive consumption of the buried anodes, but may also cause bubbles of free hydrogen to be evolved on the exposed areas, or even just under the protective bituminous coating thus tending to strip it away from the pipe, Damage may also be caused to the rectifier by severe overloading. If the soil is well dried out after a period of drought, the resistance of the soil may have increased to such a figure that the protective current is reduced below that required to afford complete protection—even though the reduced current may still afford some protection.

Constant Current Circuit

The Westinghouse Brake and Signal Company have designed a special constant current circuit for this purpose and are now supplying this type of equipment for the pipe-lines from Kirkuk to the Mediterranean, a distance of approximately 562 miles. The characteristics are important owing to the fact that these units operate in isolated areas and are visited only at infrequent intervals. During the winter season heavy rain will cause a variation of as much as 50% in the resistance of the ground. On the other hand the amount of additional current required by the pipe line does not

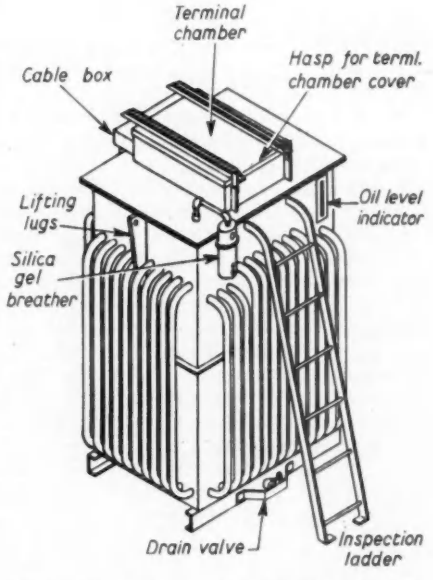
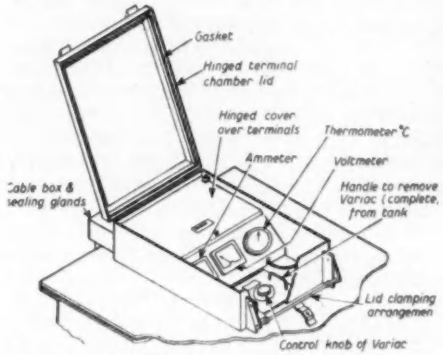


Fig. 6. Isometric view of outdoor rectifier unit

usually exceed 25% between wet and dry conditions. The circuit adopted is designed to give a current output which, when once set by turning a knob, is almost constant irrespective of the variation in external resistance



Isometric view of instrument and current control gear in terminal chamber

(Fig. 5). An ammeter and voltmeter are supplied on each unit and regulation is by means of a small "Variac" transformer in the circuit.

The units in question are shown in Figs. 6 and 7, and each consists of an oil-immersed

General view of outdoor rectifier unit

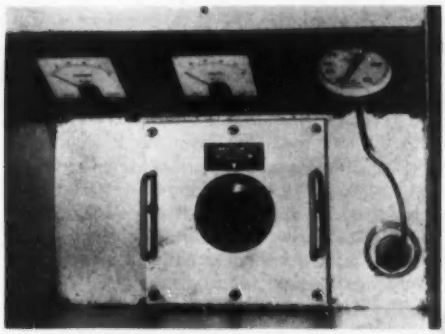


Fig. 7. This photograph shows the control panel of the terminal chamber ammeter voltmeter, thermometer and control knob for current setting

Selenium rectifier unit with a transformer incorporated in the same tank. Oil-immersed units were preferred on account of the impossibility of excluding dust and insects from air-cooled units. Moreover, the mass of oil affords additional protection against excessive temperature rise during the heat of the day although the units are shielded from direct sunlight. The rectifier is connected to the ground bed by means of a 0·1 sq in. stranded bare copper cable carried on steel poles. The distance between the ground bed and the pipe is governed by local considerations of soil resistance, etc., but is seldom more than 700 yards.

The rectifier units have an output of 40 amperes at 50 volts and the current density requirements of this particular pipe-line involve the installation of similar units at intervals varying between five and ten miles.

Determination of Current

While the rectifier unit will hold the current constant, it is very important that the correct value of current is chosen in the first place, and this is usually determined by the pipe potential. It is generally agreed that if the pipe to soil potential is maintained above a certain minimum value then corrosion is halted—indeed, long experience in America has shown this to be the case. The current from the rectifier must, therefore, be adjusted so that the pipe has the required negative potential—about 0·8 volts—with respect to the soil.

The measurements of the pipe to soil potential presents a problem in itself, because any electrode placed in contact with the soil will introduce a potential of its own forming as it

were half a voltaic cell. It is, therefore, necessary that this potential should be known and constant in soils of varying compositions.

Various types of half-cell can be used for this purpose, in which the electrolyte in contact with the electrode is a definitely known solution which can be maintained in a constant condition. That most commonly used is a copper/copper sulphate half cell as shown in Fig. 8. It consists of a tube fitted at one end with a porous plug—generally wood—containing a saturated solution of copper sulphate into which a copper anode is inserted. The lower end of the tube is placed in the soil above

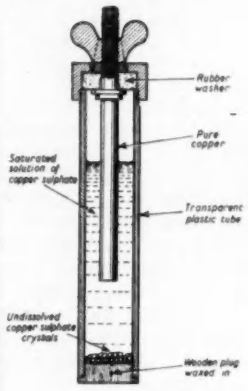


Fig. 8. Sectional view of copper/copper sulphate half cell, with porous plug

the pipe. A suitable voltmeter connected to the copper electrode can then be used to measure the potential of the pipe (with respect to the copper electrode), contact with the pipe being achieved by means of a metal probe driven through the soil.

Voltage Determination

This, of course, forms a galvanic cell, as described earlier, with two different metals and different electrolytes. Referring again to the Table of Potentials it will be noted that the potential of copper to hydrogen is +0·34 volts, while that of iron to hydrogen is −0·44, thus the potential difference between copper and iron is −0·78 volts. If, therefore, such a measurement is taken and, let us say for example, the reading is −0·4 volts, then the protective current from the rectifier must be increased until the desired figure of approximately −0·8 volts is obtained. The upper limit is approximately −2·5 volts negative at any point along the pipe, otherwise there is a danger of free hydrogen being evolved with the possibility of flaking away the bituminous or other mechanical protective covering.

The actual current density required to produce this result is difficult to determine. One authority in America, N. P. Peifer, suggests that no predetermined current density can be used for all conditions. Tests made by various engineers in the U.S. show that the current density required for protection varies from 1 to 20 mA per sq ft, depending on local conditions. The value of current that protects a pipe in one location will not protect a similar structure in another location. It would appear that the figure of 10 mA per sq ft of bare metal would be a good average. In any case, the criterion for protection is to ensure that the structure to soil potential is kept at a figure of approximately −0·8 V, as measured with a copper/copper sulphate cell and the current must be adjusted accordingly.

Bed Plates

The ground bed or sacrificial bed plate is frequently constructed by bonding together any scrap metal that may be conveniently at hand. As previously mentioned, the rate of disintegration of the sacrificial plate is, in accordance with Faraday's Law, i.e. directly proportional to the amount of current passed, and it is interesting to note that one amp flowing for one year will dissolve away approximately 20 lb of iron.

A number of installations in the U.S.A. employ carbon or carbonacious materials instead of metal anodes as sacrificial bed plates. In this case the corrosion products are largely gaseous but the great advantage is that the rate of disintegration of the carbon anode is only approximately 2 lb per annum/amp. Great care, however, must be taken to ensure that good contact is maintained between the carbonaceous materials and the soil.

General Principles Only

In conclusion it will be appreciated that only the general principles of corrosion have been discussed here. The special problems of protecting buried structures, in areas where stray earth currents are present, do not come within the scope of this article. The protection of structures immersed in sea or fresh water also presents its own problems, but in every case the same basic principles as have been described are involved, wherever a current passes out of the surface of a structure into an electrolyte, corrosion will occur at that point, and where current enters a structure protection against corrosion will be afforded.

Our readers' views ...

Uncertificated Engineers

HAVING read that glorious letter from "Uncertificated Engineer" in the issue of May 3, I feel constrained to reply, as both an old reader and an unashamed "Uncertificated Engineer," who for many years has been holding a job of control engineer in a large London station (which perhaps is now getting worse for wear). My "uncertificated" knowledge of station practice helps me admirably with my job, which includes control room, boiler house, and under arduous war conditions meant many other sidelines of good electrical and mechanical practice.

Of course, I am not a good enough engineer to write a thesis, which I agree wholeheartedly with previous writers is the most "childishly simple" method of entering an august professional institution like the I.E.E., the moguls of which have created a "closed shop" to the "technical-practical" engineer, preferring the so-called "technical man."

I cannot help but notice that since "Uncertificated Engineer" had his letter published we have had nothing from the I.E.E. or members. Is there no answer? Meanwhile, when are we to be recognised by the I.E.E. and the B.E.A.?

LONDON *A. N. Other*

◆ ◆ ◆

Inhibited Transformer Oils

WE were very interested in the references to inhibited transformer oils which appeared in the editorial of the issue of ELECTRICAL TIMES dated May 10, 1951. We have, for a number of years, marketed a transformer oil containing an inhibitor of the type to which you refer and, generally speaking, we would agree with you that such oils have not been accepted as readily in this country as they have in the U.S.A. (and, incidentally, in many European countries as well).

The attitude of British manufacturers and operators is understandable in view of the long service given by a good quality straight oil in a well designed transformer operating under normal loads. On the other hand, however, we could quote several examples of transformers operating under difficult conditions where the need for frequent oil changes has been obviated by the use of our inhibited oil. We would not like manufacturers to regard this as an invitation to design more critical transformers, but we do suggest it shows that the use of inhibited oils would allow them greater latitude.

There seems to be a certain amount of misunderstanding about the requirement in B.S.S. 148, 1951, that, when an inhibitor is used, the base oil itself must meet the specification. Some people interpret this as evidence that the B.S.I. have no confidence in the use of inhibitors.

This, of course, is not the case; the sole object of this requirement is, as you have pointed out, to ensure that inhibitors are not used to bolster up poor quality oils. Such is not the true function of inhibitors; they should only be used to improve oils which are already as good as normal refining techniques can make them.

C. F. McCue

ESSO PETROLEUM COMPANY, LTD.

◆ ◆ ◆

Purchase Tax

THERE have been several opinions expressed in recent issues on the matter of purchase tax and its inclusion on price tickets. While I feel that it is infuriating to find, after looking at a price, that there is up to 66⅔ or even 100% to be added for purchase tax, I also feel that it is bad psychologically, baldly to state a price which seems in itself excessive.

I agree with Mr. Wildsmith that the public do not always realise what a large proportion of the price is represented by tax, and I feel that no opportunity should be lost of reminding them of that fact. Why not, therefore, print all three figures on the price ticket—the actual price and the P.T. being shown in smaller figures? Then everyone would be happy—except those whose business it is to prove to the public that the benefits of the "Farewell" State are provided free of charge.

LONDON *A Disgruntled Dealer*

INFRA-RED DECOMPOUNDING

THE usual method of decompounding sealing boxes is to use a blow lamp. This needs considerable skill to prevent damage to porcelain bushings and paxolin insulation. As a large box may take four or five hours to decompound, the cost is high, and there always remains an element of fire risk. Moreover, the melted compound is not usually fit for re-use. A method which has been in use in Cornwall for about twelve months, due to Mr. J. A. Wright, second assistant engineer Cornwall Sub-Area, S.W. Board, uses infra-red heating.

The equipment consists of a bank of ten Mazda 250 watt 110-115 V infra-red lamps, with internal reflectors wired two in series to work from 230 V mains, and mounted on a 22 gauge galvanised iron backplate on a pipe stand.

General view of the unit melting out a right-angle cable box

It has been found in practice that the lamps clean nearly all the compound from a cable box, leaving only a thin film, which can be removed with a paraffin blow lamp in the usual way. The compound melted by the infra-red lamps is run off and stored for re-use on l.v. work.

When used out of doors the box is usually screened from the wind, as a current of cold air passing across the surface of the hot compound has a considerable cooling effect and so retards the flow. It is thought that the heat transfer is reasonably efficient, owing to the dark colour of the compound.

Relatively little labour and supervision is required; it has been found in practice that when cleaning a pole type cable box, the time has been cut down by 50% and the cost by about 90% by using this method. This practical suggestion of Mr. J. A. Wright gained for him an award by the South Western Electricity Board, as we earlier reported.

"THE EDISON GROUP"

THE Edison Group in Italy consists of a number of enterprises whose main activity is the generation and distribution of electric power over a large part of Northern Italy. Full details of this group have now been published in a book "The Edison Group" issued by the organisation whose head offices are located at Milan, Foro Bonaparte 31. The first section of the volume is mainly of historical interest as it describes the development of the concern from the "Comitato per le Applicazioni dell'Elettricita, sistema Edison, in Italia" established in Milan in 1882—which incidentally operated the old S. Radegonda theatre in Milan, the first station in the European Continent for the production and public distribution of electric power—up to the large organisation of the present day.

Following this historical section is a series of descriptions of the hydro-electric schemes in operation, under construction and projected in the area of operation of the group. These plants are mainly located in six principal basins; the Toce, Adda, Oglio, Adige, Maira and Varaita River basins, and number 206 in all. They will have an installed capacity of over 2×10^6 kW and in a normal water year, can generate over $6{\cdot}5 \times 10^9$ kWh. In addition to these hydro-stations, the group operated some seven steam stations totalling 120,820 kW in capacity, mainly used for peak load operation, although additional units possibly for base load are now being installed.

The descriptions of the stations and civil engineering works are mainly illustrative, a high standard of photographic reproduction being achieved.

Finally, some details of the associated companies, whose interests range from gasworks equipment to chemical and glass production, and of welfare and training courses are also given.

British Instruments

Increasing importance of electric and electronic instruments culminates in first specialised exhibition at Olympia, London

YESTERDAY'S opening of the British Instrument Industries' Exhibition at Olympia marked the beginning of a new venture in the display year. Amongst the organisations actively supporting the exhibition are B.E.A.M.A. and S.I.M.A., and the electrical industry will no doubt watch its degree of success with close attention.

Of course, not all the exhibits are of direct interest to the electrical engineer working in the power field, so the review presented below, which has been written from his standpoint, is far from being a complete survey of the exhibits of the 150 manufacturers taking part.

The exhibition remains open daily, except Sunday, until 6 p.m. on Saturday, July 14. The hours of admission are 11 a.m. to 8 p.m.

Recorders and Controllers

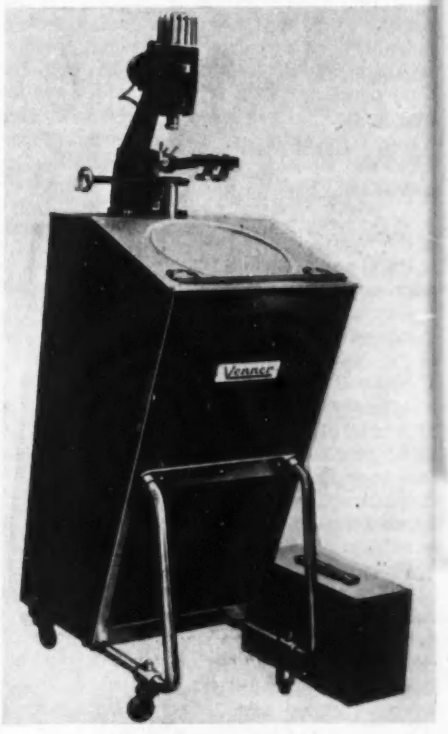
Recording meters and control designs are to be seen on many of the stands. CAMBRIDGE INSTRUMENTS are showing a pen recorder with a response time of 0·5 seconds for a 180 mm wide chart. Contra-rotating magnetic clutches are used in this design to drive the recorder towards balance, and accurate rebalancing can be obtained with voltages down to 1 mV for full scale unbalance at a circuit resistance of 1,000 ohm. Continuous balance recorders are also shown by ELLIOTT BROS., one version having a 10 in. scale with a response time of 3·5 sec for full scale deflection. Temperature controllers are to be seen on the same stand.

A controller suitable for industrial purposes is shown by EVERSHED AND VIGNOLES. This instrument incorporates an electro-pneumatic relay as its operating element. The FOSTER INSTRUMENTS LTD. and KELVIN AND HUGHES controllers are of the reactance type, in which the indicating arm moves to unbalance an oscillatory circuit, so initiating a restoring action in the main circuit. The latter firm also has on show, in this connection, a high-speed pen recorder which, working in connection with 7·5 mm Teledeltos paper, gives a response speed of 2·5 milliseconds, and is linear up to 90 c/s. MUIRHEAD LTD. present a recorder with its pen carriage actuated by a magslip synchronous link.

Other interesting features under this heading are recorders by FIELDEN (ELECTRONICS), NALDER BROS. AND THOMPSON, SUNVIC, and a wide range of chart designs by RECORDER CHARTS LTD. ELCONTROL LTD. are showing two-position controllers.

Supply Industry

Instruments of special interest to the supply industry are featured on a few stands, notably that of METROPOLITAN VICKERS. Here three-zone impedance protection is demonstrated, together with a rotor earth fault alarm and a rotor winding temperature alarm. NALDER BROS. AND THOMPSON also show more than one item under this heading. Apart from protective



Venner's contour projector

A selection of instruments displayed at the Fair. Reading across the two pages from left to right are, a Pye pH meter, a light meter by Evans Electroselenium, an a.c./d.c. voltmeter by Sangamo Weston, Ferranti's 8 in. square dial ammeter, the Cambridge universal galvanometer, the ubiquitious Avometer, and a 3½ft. portable pyrometer manufactured by Sifam

relays, there is an interesting alternator stability indicator in the form of a vectormeter reading over a power chart of the machine concerned. Also of interest is a device for proving the earthing of electric portable tools.

Peak load controllers are featured by two firms. SUNVIC have a device which switches off given circuits when a predetermined load is exceeded, while the ELECTRICAL APPARATUS CO. are showing their more adaptable instrument which attracted so much attention at Brighton. It is a voltage or frequency device which, when the governing parameter has fallen through a predetermined range, switches off the supply at 15-second intervals until the total connected load is reduced to a pre-set magnitude. No restriction is placed on loading during off-peak hours. CROMPTON PARKINSON LTD. are showing a range of house-service meters, and ELLIOTT BROS., a kVA alarm.

Indicating Instruments

Panel mounting and portable meters have so wide an application in industry that they appear as a secondary display on many stands. Amongst special items noted are the 4 in. and 6 in. flush-mounting instruments shown by ENGLISH ELECTRIC, which the company expects to replace the projecting type hitherto featured. Examples of this design are shown mounted on switchgear cabinets. In the FERRANTI display there are instruments hermetically sealed for tropical use, while RECORD ELECTRICAL CO. include Buxton certified instruments, as well as a redesigned m.c. model of their 270° "Circscale" meter.

Other firms with exhibits under this heading are CROMPTON PARKINSON, G.E.C., BALDWIN INSTRUMENTS, NALDER BROS. AND THOMPSON, METROPOLITAN VICKERS, EVERETT EDGCUMBE, MEASURING INSTRUMENTS (PULLIN), SANGAMO WESTON, SIFAM AND VICTORIA INSTRUMENTS. The first two of these, together with FERRANTI are also showing clip-on type instruments.

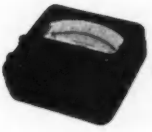
Production Accessories

Besides the recorders and controllers already described, there are several other instruments on show at the exhibition which have a direct application to production. Notable amongst these are the thickness gauges, which make use of beta and gamma radiation to check the dimensions of moving sheets, etc. BALDWIN INSTRUMENT have both types displayed, the former with a radio-active source giving a four-year life. Similar instruments are also exhibited by E. K. COLE. Another industrial inspection device worth noting is the CINEMA-TELEVISION detector for ferrous and non-ferrous metals, which will work with any normally non-metallic product.

Both ELCONTROL and FERRANTI have line-following equipment on view, with details of its application to such problems as the guiding of textiles and the maintenance of register in printing operations. The useful magnetic sorting bridge designed by G.E.C. is demonstrated in use with a special presentation on a large cathode-ray tube. Ultrasonic techniques in industry are represented by the magneto-striction generator included in the MULLARD display, and by the ultrasonic soldering iron for facilitating the soldering of light metals without a flux. An ultrasonic soldering bath is a new feature presented on this stand. As another example of the inspection applications of this technique, KELVIN AND HUGHES are showing an ultrasonic flow detector with a variety of probes.

ENGLISH ELECTRIC are featuring their 10 kV portable electronic insulation tester, capable of measuring values up to 250 MΩ, and of giving aural indication of ionisation in the dielectric being inspected.

Once again, many instruments that are applicable to boiler-house measurements, and so of interest to generation engineers, have been included under the heading Recorders and Controllers. Amongst those remaining, there



is the BAILEY boiler meter, which records steam flow from the boiler and indicates the equivalent air flow for economical combustion. KELVIN AND HUGHES show their "Klinkhoff" type lossmeter, a crossed pointer instrument which, besides reading $CO\&H_2$, CO_2 and temperature of the flue gases, indicates the heat loss as a percentage of the total heat available in a given fuel.

Flue gas analysis meters are also shown by ELLIOTT BROS. and by CAMBRIDGE INSTRUMENTS and the latter firm are featuring a new 16-page monograph on the thermal conductivity method of gas analysis, specially prepared for those interested in the applications of this method. The wide range of GEORGE KENT boiler instruments is represented by a full-size boiler control panel mounting a number of these meters, and by a scale model of an instrument panel for the new B.E.A. power station at Uskmouth.

Test Sets

Multi-range instruments are popular with the test engineer, and a wide selection is presented at the exhibition. Probably the instrument with the greatest versatility is the 53 range S75, 6 in. scale set, shown by SANGAMO WESTON. This has two 20-position rotary switches for range selection and a self-contained power pack for resistance measurements and 500 V insulation checks. In a similar class comes the new Model 8 Avometer, latest addition to the selection offered by the AUTOMATIC COIL WINDER CO. This instrument reads 2·5 V to 2·5 kV a.c. and d.c., 50 microamp to 10 amp d.c., and 100 mA to 10 amp a.c., and gives direct resistance readings up to 20 MΩ using internal batteries.

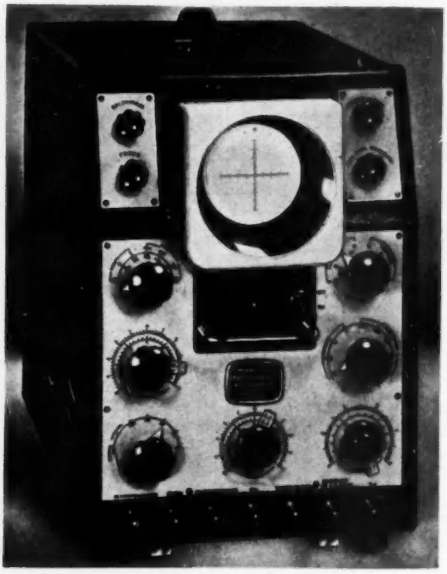
The CROMPTON PARKINSON "Alltest" instrument is essentially a d.c. meter, but converting units are available for modifying it for use in a.c. circuits. ELLIOTT BROS "Weameter," on the other hand, is an a.c. instrument for measuring amps, volts and watts. Finally in this category, this time in the field of resistance checking, come ohmmeters by RECORD ELECTRICAL CO. and ELECTRONIC INSTRUMENTS LTD.

Oscillographs

Waveform investigations are important in many branches of technology, and this is apparent in the special purposes for which some of the oscillographic equipment shown at the exhibition is adapted. Amongst the general-purpose instruments shown are two COSSOR double-beam oscillographs, each having a 4 in. dia. screen. The first has amplifiers for the frequency range d.c. to 100 kc/s, while the other has one amplifier dealing with 20 c/s to 7 mc/s, and the other with 20 c/s to 100 kc/s. A suitable camera is also on view.

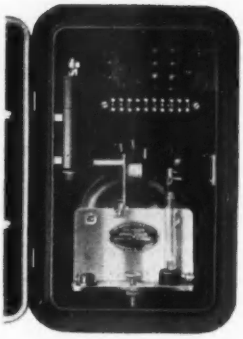
At the MULLARD stand is presented a h.f. oscilloscope covering the range d.c. to 15 mc/s, with a time base giving sweeps from 0·1 microseconds to 5 seconds. The instrument is thus applicable to investigations of the waveform of high-speed transients. Another equipment for transient studies is shown by SOUTHERN INSTRUMENTS as part of their display of Minirack designs. It is a 10 kV transient recorder with a sweep time range of 1 microsecond to 1 millisecond. Also to be seen on this stand is the company's universal recording camera, which has many applications in the field of waveform measurement.

Included in the interesting display of research equipment on the D.S.I.R. stand is an E.R.A. development, the recollectograph. This instrument provides oscillographic records of random electrical disturbances of infrequent occurrence in power-supply systems. Another special-purpose unit is the MUIRHEAD-PAMETRADA wave analyser, which was designed to facilitate investigations into machinery vibration. Another wave analyser is featured by MARCONI INSTRUMENTS, this being the TF455D, for the direct measurement (20 c/s to 16 kc/s) of the



components of complex voltage waves. Inevitably, in such an exhibition as this, there are instruments and accessories on view which, though of general interest to electrical engineers, do not come under any convenient heading. Examples are the various timing sets, such as the CINEMA-TELEVISION micro-second counter, with ranges from 1 micro-second to 1 second, and 10 microseconds to 10 seconds. Another, somewhat similar, instrument is ELECTRONIC INSTRUMENTS' "Chronotron" millisecond meter.

W. G. PYE include in their display a range of multi-purpose precision switches specially designed for thermo-couple and other applications where low contact resistances are pre-



Right: An oxygen analyser equipment which is shown by George Kent, while on the left, the Cossor 1035 oscillograph is clearly shown

scribed. For heavier applications there is a range of toggle and appliance switches on the BULGIN stand.

Galvanometers are especially to the fore in the CAMBRIDGE INSTRUMENTS display, but they are also to be found, for various applications, on the stands of INDUSTRIAL PYROMETERS, PYE, and SANGAMO WESTON.

Vacuum pumps for a wide variety of uses are shown by W. EDWARDS, and use can be found for them in many experimental projects. The same may be said of the humidity ovens and muffle furnaces to be seen on the stand of A. GALLENKAMP, and of the "Eel" general-purpose photometer and colour temperature meter which is shown by EVANS ELECTRO-SELENIUM.

Finally, in the ancilliary classification, may be noted the lightweight alkaline miniature accumulators shown by VENNER TIME SWITCHES. This firm is also displaying a contour projector suitable for accurate and rapid inspection of small parts. On the stand of the TELEGRAPH CONSTRUCTION AND MAINTENANCE CO. the various alloys developed by that concern's metals division are featured.

STAND NOS. AT B.I.I.E.

Airmec Laboratories ...	26	English Electric	D9	Mullard	D4
Automatic Coil Winder...	118	Evans Electroselenium ...	89	Nalder Bros. and Thompson	F2
Bailey Meters	D5	Everett Edgcumbe ...	135	R. B. Pullin	67
Baldwin Instrument ...	83	Evershed and Vignoles ...	E4	W. G. Pye	33
Bulgin	132	Ferranti	68	Record Electrical ...	E7
Cambridge Instrument ...	B7	Fielden (Electronics) ...	66	Recorder Charts	95
Cinema-Television ...	C3	Foster Instrument ...	E8	Sangamo Weston ...	G3
E. K. Cole	C1	Furzehill Laboratories ...	A2	Sifam Electrical Inst. ...	73
A. C. Cossor	123	A. Gallenkamp	B2	Southern Instruments ...	125
Crompton Parkinson ...	D2	G.E.C.	G3	Sunvic Controls	E5
D.S.I.R.	C5	Industrial Pyrometers ...	162	T.C.M.	91
Elcontrols...	129	Kelvin and Hughes ...	H2	H. Tinsley	141
Electrical Apparatus ...	98	George Kent	F7	Turner Electrical Inst. ...	127
Electroflo Meters ...	F6	Marconi Instruments ...	D9	Venner Time Switches ...	102
Electronic Instruments ...	92	Metropolitan Vickers ...	D6	V.I.C. (Bournemouth) ...	62
Elliott Bros.	66	Muirhead	D8		

Problems and Practice
IN ENGINEERING

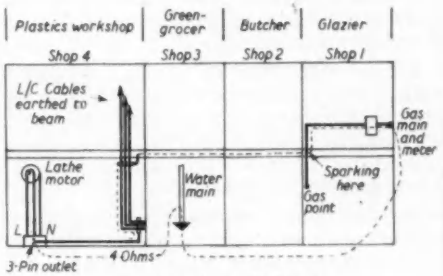
Overheated Brushes

I WAS recently called to investigate trouble in a 400 V 40 h.p. compound d.c. motor driving a centrifugal pump. The motor had been in service for many years, and had given reliable service. The trouble which had arisen was overheating of some of the brushes, the heating reaching incandescence and then dying away, to begin heating again after a short time had elapsed. As the motor was in a rather dark situation the effect was quite startling.

I found that each of the six brush boxes on the four arms had been fitted with a piece of brass wire gauze, this being placed on top of the brush and pressed on to it by the spring pressure device. Apparently the gauze had been fitted in order to give a better contact between the brush and the pressure-applying fitting. The brass wire gauze pieces had become verdigreased, and, concentrating on those supporting the brushes which were giving trouble, I thoroughly cleaned these gauzes and replaced them. This work did not, however, remove the trouble, the same brushes becoming overheated as before. At first this apparent lack of success caused concern, but it was then realised that the overheating of the particular brushes was in fact not due to defects in those brushes, but because other brushes were not carrying their share of current, this being another instance of the cause being removed from the seat of the trouble. It was verified that the gauze pieces behind other brushes were in worse condition than those before mentioned, and were clearly preventing the equal distribution of current to the brushes. New gauze was obtained and fitted behind all the brushes, when the trouble ceased.—*A. R. B.*

Uncertain Earthing

CALLED in to investigate sparking between a steel ceiling beam and a gas pipe which crossed it, the supply main fuses were removed, but sparking continued. Realising that the beam was being made "live" and passing the current on to earth via the gas pipe, the problem was to locate the exact spot. This was the end shop in a parade of four, with flats above. The beam ran throughout them, so any could be responsible. Allowing the sparking points to come lightly together, it was with a fair amount of luck found that the "fireworks" coincided with switching on and off a lathe motor in a shop at the far end of the parade. Checking the circuit, flexible leads from a socket outlet were found to be crossed, the earth lead being used



Earthing circuits in shops

as neutral. The socket outlet earth was traced and found bonded to an earlier lighting installation in l.c. cables. This in turn was found to have been "earthed" via a home-made clip to the steel beam. As far as could be found, the beam itself was not earthed; only by virtue of the touching gas pipe in the first shop, which was well pitted with arcing, and must surely have ignited eventually.

From the lathe outlet earth socket to a nearby water main, 4 ohms was measured.—*Inspector.*

Magnetic Troubles

A MACHINE was designed to carry flour from a blender to a weigh-bucket situated above, so that dough bowls could be wheeled underneath and the contents of the bucket discharged. On the beam of the weigh-bucket was fixed a bracket which operated a trip switch to stop the plant when the desired weight of flour had been delivered.

As a refinement a plugging arrangement was incorporated in the automatic starter, giving a momentary jerk of reverse current to stop the machine abruptly. This would ensure very accurate weighing off. The plugging switch was fixed to the motor shaft.

Soon complaints of occasional inaccurate weights were received. The maintenance staff laboriously checked quantities on a weighing machine but could find no fault. Naturally, the

production group and the maintenance were soon at loggerheads. Fortunately, on one occasion, an electrician noticed the machine run a number of revolutions in reverse.

He examined the reversing switch on the motor shaft and found evidence of an earth track. This was put right and, for a day or two, all was well, but trouble soon started again. Gradually various theories were sorted out and the surprising notion arose that residual magnetism in the reversing contactor of the a.c. starter was the cause of the bother.

A piece of gummed paper was stuck over the faces of the electro-magnet and from then on the weights were accurate.

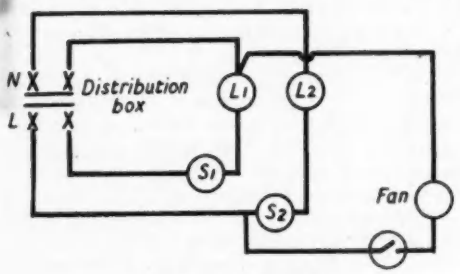
On being informed of this, the switchgear makers sent on another armature, but the results were no better. They finally posted on a spring arrangement to force the surfaces apart. This effected a complete cure, but obviously the metal itself was the real culprit.

Another magnet trouble of a more amusing nature concerned an electro-magnet which was used for the purpose of removing nails or other ferrous fragments from currants and raisins. It was placed above a canvas band on which the fruit was conveyed after washing. The manager discovered that the staff were guilty of leaving the coils switched on when the machine was not in use, so an apprentice was detailed to connect a tell tale.

Unfortunately he wired it across the coils in place of a resister, and when they were switched off the collapsing flux was sufficient to cause an overvoltage and blow the lamp. It was a valuable, if expensive, lesson on elementary electricity and magnetism.—*W. H. A.*

Sneak Circuit Danger

I WAS called to change a s/p switch on a lighting circuit. I withdrew both fuses and commenced the job. I took off the feed and then got a shock off the switch wire. A test lamp indicated it was almost full voltage.



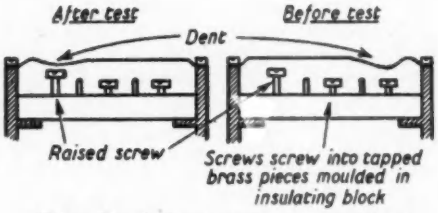
Lighting circuit connections

I later discovered someone had connected a small fan from the live side of a switch on No. 2 circuit and connected the N to the N of No. 1 circuit. So that I was completing the fan circuit to earth via the filament of lamp 1.—*G. A. Henson.*

Routine Maintenance Causes

ROUTINE maintenance required that a Megger test be taken on all electrical equipment on an overhead crane periodically. One of the motors was a three-phase 400 V s.r. machine operated by a drum controller.

This motor had the usual terminal box on top of the casing and the external connections were connected to the internal stator leads by lugs and cheeze-head screws.



Effect of replacing cover in reverse position

After taking the Megger test the cover was replaced. It was noticed at this stage that the cover was dented at one end. On attempting to run the motor it refused to start, which was most confusing as the crane had been in use a few hours earlier.

The terminal box cover was removed and a clue provided by the smell of burning rubber. On closer examination a "splash" was found on top of one of the cheese-head screws and a corresponding "splash" on the inside of the cover in the region of the dent. Examination of the main switch fuse showed that two fuses had "blown."

It had not been noticed that one cheese-head screw was higher than the others due to a lug of different thickness to the others being used on the incoming cable, also that in replacing the cover this had been turned round so that the dent was now in contact with the "raised" screw when the cover was tightened down. The dent was removed, the "splashes" smoothed off, and two new fuses inserted.

The motor was started and ran normally.—*Samuel Mooney.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

Rectifier-Controlled Variable Speed Drives

*Some Comments on Mr. Milne's Article**

By C. BEVERIDGE, A.M.I.E.E.

THE recent article by J. C. Milne which, by his own sub-title, is termed "a critical appreciation" does not, however, criticise the induction regulator control.

Present-day variable-speed drives usually require close regulation of the output speed, and this leads by necessity to servo control.

In the case of grid control and ignitron igniter control, this is accomplished satisfactorily, but it is difficult to see how close regulation using servo control could be satisfactorily applied to an induction regulator, and if possible, the response would be poor. In order to obtain voltage control with the induction regulator, it is necessary to move large masses of material by means of a pilot motor and geared drive, resulting in very large time lags and probably backlash.

In many of the applications mentioned by the author, it is usual to require a low crawling speed, sometimes as low as 2% of the top speed. Now if a d.c. motor armature is supplied with normal d.c. current at a constant voltage and the field is kept constant at full field, then the torque speed curve is as illustrated in Fig. 1, from which it will be seen that speed regulation is very bad at this low speed. It therefore follows that with an induction regulator controlled rectifier, it cannot be even as good as this unacceptable performance. Obviously some form of compensation of the natural motor characteristic is required, and this often takes the form of IR compensation, which introduces a servo control.

It is difficult to see how the author would accomplish such a control with the high mechanical inertia of the induction regulator. Even if a servo control is possible with an induction regulator control, the problem of stabilising such an arrangement would be even more difficult.

It should also be pointed out that if as is usual a d.c. motor having a 2 to 1 field range is used then the power factor of all the rectifier schemes is the same between half speed and top speed.

The author's simplified theoretical analysis of the current waveforms ignoring "other

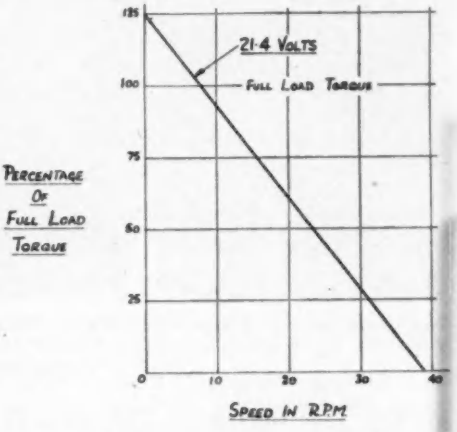


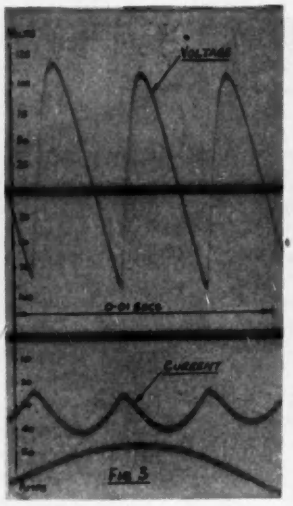
Fig. 1. Torque-speed characteristic of 37½ h.p. 700/1400 r.p.m. 400V d.c. compound motor

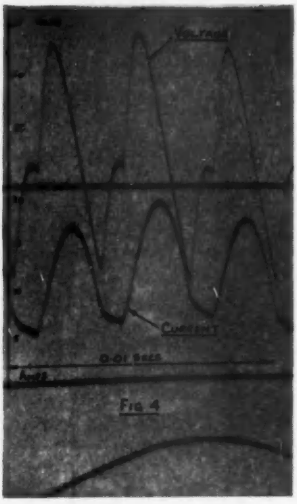
features" which he states "are comparatively minor" tends to give the uninitiated a distorted picture of what actually occurs in practice. In order to put this in its proper perspective, it should be borne in mind that most variable-speed drives of this type employ six-phase rectification and steps are taken to avoid discontinuous current.

Figs. 2, 3 and 4 show oscillograph curves of armature voltage and current for different values of load when operating 37½ h.p., 700/1400 r.p.m., 400-volt d.c. compound-wound motors at less than 2% of top speed, from a six-phase grid-controlled rectifier having a double star connection with an interphase transformer. The effect on the current waveform of the inductance of the motor armature together with a small choke in series is clearly shown, and it will be noted that there is no discontinuous current even at light load which is the worst condition.

The peak d.c. currents given by the author ignore field weakening and if this is, say, 2 to 1, then the maximum of 4 I_{dc} is reduced to 2 I_{dc} where I_{dc} is the motor full-load current, and the difficulties with interpoles and commutation are not experienced. Actually, in practice com-

*ELECTRICAL TIMES, 24 May, 1951





Voltage and current waveforms for 3-37½ h.p. motors in parallel: Fig. 2. Each giving full load torque at standstill. Fig. 3. Each giving 33⅓% full load torque at 25 r.p.m. Fig. 4. Each giving 7½% full load torque at 25 r.p.m.

mutation is good, and the writer has not experienced any trouble.

The author's reference to ignitrons is rather misleading, as the ignitron is only another form of rectifier and could, if so desired, be used with an induction regulator, and no firing delay.

Finally, I would suggest that the article would have been more correctly entitled "The Advantages (only) of the Induction Regulator Controlled Rectifier Variable Speed-Drive."

Electricity Production Analysed

NET output per person employed in the electricity supply industry in Great Britain in 1948 was £911, compared with £613 in 1935. This information is given, with other interesting statistics, in Preliminary Report No. 155, based on the 1948 survey of production. Included in the establishments surveyed are those of transport and other non-nationalised undertakings, but private works generation is, in general, excluded.

Overall Value

Total value of production in 1948 was £241·719 m., which after allowing for cost of materials, fuel and electricity used (purchased from outside sources) at £104·634 m., gives a net output of £137·085m., achieved by 150,409 employees who received wages and salaries totalling £52·022 m. Thus the average salary in the industry was £346 per annum.

Corresponding figures for 1935 show gross value of production at £87·445 m., with materials, etc., costing £23·579 m. The resulting net output of £62·837 m. was achieved by 102,480 workers, the net output per person employed being £613. Comparable figures for wages and salaries are not available.

An analysis of the value of production total is given in the accompanying table.

During 1948, the industry acquired plant and machinery (including meters, mains, transmission lines and railway sidings) to the value of £64·995 m., and disposed of corresponding plant worth

VALUE OF PRODUCTION—£ Million

	1948	1935
Electricity sold to consumers	198·706	71·707
By- and waste-products sold ...	·781	—
Rents received	3·841	—
Net receipts, sales of appliances	1·356	—
Work done for consumers ...	9·306	3·766
Work of new construction ...	27·729	11·972
	241·719	87·445

£0.433 m. With appliances for hire to the value £1·387 m. issued during the year, and new vehicles worth £1·138 . purchased, the total capital expenditure on plant, etc., was £67·520 m. New buildings cost £24·081 m., so the overall capital expenditure was £91·601 m.

The full details of this preliminary report are to be published in next Saturday's *Board of Trade Journal*, dated July 7.

P.T. still hampers Electric Vehicles

E.V.A. Annual Report and Lunch

PURCHASE tax was still cramping the electric vehicle industry, emphasised MR. PETER ROCHS (chairman) at the annual lunch of the Electric Vehicle Association of Great Britain, on Wednesday of last week. Despite the efforts which had been made to obtain redress, the sole result had been relief to one section of the industry —the pedestrian controlled vehicle—thus making an iniquitous and absurd distinction between two sections of manufacturers.

It had been represented to a very senior Treasury official, deputising for the Chancellor, that electric vehicles were saving 16,000,000 gallons of imported fuel per ye This achieved, in effect, a substitution of low-grade coal—of a type not exportable—and, in addition to a saving of $2,500,000 in dollar imports, gave a revenue of £415,000 to the B.E.A. for 140 million units bf off-peak load, not to mention their ancillary advantages of long life, higher carrying capacity, low accident risk and great savings in labour and maintenance. In spite of an almost deceptively sympathetic hearing, no action whatsoever had been taken, and it was difficult to understand why it should be so. There could be little political capital to be made out of such an action, and it was laughable to imagine that the automobile industry would care two hoots about the E.V.A.'s "vest-pocket" industry. The tax on an electric vehicle was higher than on a comparable petrol vehicle—yet a reasonable estimate of the income from P.T. on electric vehicles in 1951 would be a mere £156,000.

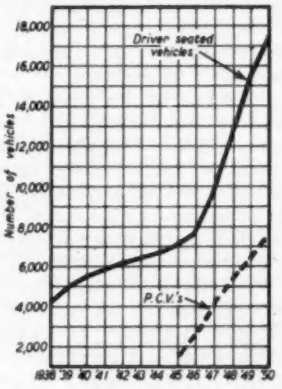
Mr. Rochs was replying to the toast of "The Electric Vehicle Association," which had been proposed by the RT. HON. G. R. STRAUSS, M.P. (Minister of Supply), in a speech which contained tantalising references to the fillip which the industry would receive if P.T. were removed and the Government placed large orders for electric vehicles. One of the electric vehicle's chief attractions was its safety, combined with its absence of noise and fumes.

Mr. Rochs speaking at the lunch

The toast of "The Electric Vehicle User" was proposed by MR. H. V. SCHOFIELD, M.C., M.I.E.E. (director, Chloride Batteries Ltd.), who laid special stress on the benefit which the off-peak load would convey to the B.E.A.

Reply to the toast was by MR. W. A. NELL (chairman, Express Dairy Co.), who spoke as one of the largest users of electric vehicles in the country. When he first joined the company after service in the 1914-18 war, the entire transport fleet was represented by a few steam wagons, a 4-ton lorry and a "director's car." Today they had 3,000 vehicles, of which 1,500 were electric, approximately two-thirds being p.c.vs or prams, and one-third standard-type vans. Only one thing worried the electrical user—the high capital outlay, and he stressed the absurdity of P.T. on vehicles used to deliver food. Manufacturers had not yet reached finality in vehicle design, and he would give them the same advice as Lord Ashfield when shown the new L.G.O.C. bus—"Now go and build a better one." At the same time he congratulated manufacturers on the efficiency they had attained.

Progress of the electric vehicle since 1938



Annual Report

The annual report, presented at the 17th annual general meeting, covered the year ending December 31, 1950. The major portion of its contents dealt with matters of internal interest, including a detailed statement of the steps taken in the matter of purchase tax. Some interesting statistics were given, which are reproduced in graphic form. The total number of vehicles between 1945 and 1950 increased from 8,700 to 25,235—nearly threefold. This was made up of increases in driver-seated vehicles from 7,009 to 17,613, and from 1,691 p.c.vs to 7,622.

Cookers in France

A General Review of Design

By Mrs. MAY PEARCE*

ALTHOUGH it is practically impossible to make sweeping comparisons between French and English cookers, due to the different conceptions of cooking and food habits, the feature which most strongly resembles our own is the adoption of the block design. The majority of French cookers are now being constructed on this principle, together with a lid covering the hob. This results in an appliance which is very pleasing to the eye, especially when finished in white (the only colour, apart from grey, which a French housewife will accept), but it does mean that the price is often elevated above many average pockets.

General view of typical French "block" cooker with extended hob, and lid

Manufacturers are, therefore, tending to produce a utility model at a lower cost, which may feature the "leg" type of design, but without a covering to the hob, and finished in grey mottle vitreous enamel instead of white.

There is a variety of cookers on the market, and some forty models have received the Mark of Quality issued by APEL (Societé des Applications d'Electricité) the French equivalent of E.D.A. to whom acknowledgements are made for the illustrations accompanying this article.

* South Western Electricity Board. Mrs. Pearce visited France as the holder of the 1950 Caroline Haslett Travelling Exhibition in Electrical Housecraft.

Oven Heating

All ovens have top and bottom heating, the top element being the grill, this arrangement being particularly suited to general cooking requirements. The shape of the oven is usually shallower, but wider, than English types. Standard fittings include a grillpan-cum-roasting tin, two rod shelves (which may or may not be non-tippable) and a baking sheet which is made to run in on to the sides of the oven itself and is perfectly satisfactory with radiant heating. Pastries which are required to be well browned underneath are invariably cooked on this sheet, and the grill is often turned on at the end of the cooking period to give a really brown finish to the top.

At the moment there are only two cookers recently put on the market which have thermostats fitted to the ovens, and simmerstats on the hotplates. It is apparently impossible as yet to determine their success with the public, as they have only been available for such a short time. There is, as yet, no consolidated official move towards requiring thermostats as standard fittings, but reading between the lines, it would not be at all surprising if some manufacturers, other than the two who have already done so, did not produce thermostatically controlled ovens in the not-so-distant future.

All the new gas cookers are already fitted with oven thermostats.

The majority of cookers have their oven heating controlled by either one or two three-heat switches. Thermometers and thermostats, except on the two cookers already mentioned, are not provided, and it is necessary for an oven to be heated on the basis of clock-timing. The temperature must be tested by the hand.

In the case where both the top and bottom oven elements are controlled by one three-heat switch only, the four positions available are off, grill high, grill low (black heat) and top and bottom elements on together in series, giving a total loading of anything from approximately

550-800 W. Top elements vary from approximately 1,200 to 1,700 W.

The tendency to keep down the loading has

General view of typical French "block" cooker without lid to hob

been necessary in many instances where house installations are not really adequate. Manufacturers have been forced to keep in mind this often restricting point. A further necessity is to keep down the cost of the cooker, which may result in utility or cheaper type models being produced with only one oven switch.

Some manufacturers are now making their slightly more expensive cookers with a three-heat switch to each of the two oven elements. This gives, on the grill, a red heat oven over the whole surface on the full position, alternate spirals on at red heat on medium, and the whole surface at black heat on low. The bottom oven element, embedded underneath the floor of the oven, is controlled by the second three-heat switch, which gives corresponding degrees of heating. Loadings of the grill vary from between approximately 1,200-1,700 W, and of the bottom element from between approximately 900-1,250 W.

The reason for simmerstats not yet having achieved wide popularity is that Continental regulations require double-pole switching, and a d.p. simmerstat has only recently become generally available. It is felt that they will soon be more universally applied.

Baking in typical "leg" type cooker

Hotplates

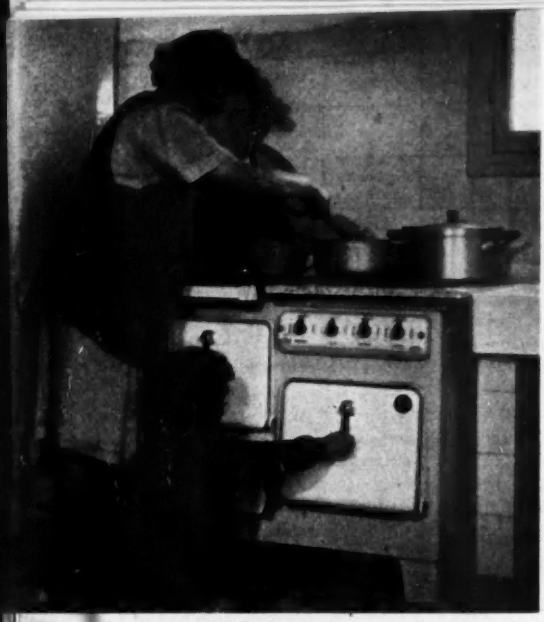
The most popular hotplate was undoubtedly the radiant type. This was due to all the usual reasons which likewise hold good in this country, coupled with the fact that loadings of these plates are sometimes slightly higher. Apart from the solid hotplate, another type often used is one of Swiss design, which is composed of concentric circles independently sprung which "give" to bumps and bulges in distorted saucepans.

Most manufacturers make their hotplates to the specifications laid down as standard, although this is not compulsory. The interchangeability of hotplates is sometimes facilitated in another way. The circles cut out in hobs are often made larger than might be necessary. If the hotplate surface does not completely fill this space, a black enamel ring is placed around the plate itself to ensure that there is no gap. In this way, it is possible to fit a plate of different size without affecting the design of the hob. Many hotplates plug directly into a central socket—a method which is considered by many to be far sturdier than those which are plugged in by a side fitting.

Standard hotplate loadings are:-

	Solid	*Radiant*
5¼ inches	1,000 watts	1,200 watts
6¼ ,,	1,200 ,, *	—
7 ,,	1,500 ,,	1,800 ,, *
8 ,,	1,800 ,,	—
8¼ ,,	2,000 ,,	2,500 ,,

(*The most popular, according to statistics)



Combined solid fuel and electric cooker as used in rural premises

Other Details

The drop-down door would appear to be preferred in every way, and is fitted to all cookers. Oven linings, apart from in one of the newer type cookers already fitted with thermostatic oven control, are not removeable. Wire or enamel runners for shelves are very often unhookable for cleaning purposes. Ventilation facilities are fitted to most, but not all, ovens.

Hobs are frequently extended to give extra hob cooking space, since so much French cooking involves the making of sauces and the frequent use of the frying pan. Surprisingly, solid hotplate surfaces are often deliberately raised approximately a quarter of an inch above hob-level, since it was considered that housewives would find it more economical to use only once saucepan on one hotplate at a time.

A few of the new cookers are now fitted with heated warming drawers for plates and dishes underneath the oven, but this practice is by no means general, and many cookers are without the plate-warming facilities of a hot cupboard.

Hybrids

"Mixed" cookers, having the hob composed partly or entirely of gas burners, and the oven electric, are very popular with a certain section of the population. These cookers have the twofold advantage of both keeping down the electrical load, where this is necessary, and also of providing those people who prefer gas to electricity for boiling purposes with an electric oven. It must be admitted at this point, that many people do really prefer gas for use on the hob, but at the same time would invariably wish to have an electric oven. These "mixed" cookers have a further slight advantage to recommend them, as they are always the equivalent of a few pounds cheaper than their all-electrical counterparts.

The cheapest "utility" type full-sized cooker available is approximately £28, whilst one of the newest block designs, in white enamel, may reach the price of almost £50. The two new types fitted with thermostats and simmerstats already mentioned are £45 and £85 respectively. Generally speaking, French cookers tend to be dearer than our own when considering comparisons in sizes and facilities offered.

BRITISH STANDARDS

Colour Identification of Pipe Lines. *B.S. 1710, 1951, price 2s. 6d.* During the past 20 years three British Standards have been published dealing with the identification of piping, and certain anomalies have arisen. In order to remove these difficulties and to co-ordinate requirements, the present code has been prepared and replaces B.S. 457 "Identification of Chemical Pipes Lines," B.S. 617 "Identification of Pipes, Conduits, Ducts and Cables in buildings," and B.S. 3011 "Identification colours for Engine Room Piping," but it does not supersede the British Standards dealing with gas cylinders and medical gas cylinders nor does it affect the provisions of B.S. 158, which deals with the colour identification of switchgear bus-bars and connections and wire.

The Standard itself provides primary indentification colours which indicate the class of content in pipe lines, these colours being applied along the length of the pipe or in broad rings, as desired. Detailed identification of the contents by narrow rings or letters and for certain special conditions, are covered in the appendices.

Fixing Accessories for Building Purposes. *S. B. 1494, 1951, price 6s.* This revised British Standard covers requirements for materials and dimensions of fixing accessories in general use in the building industry but does not cover fixings which, because of their special applications, are already given in the British Standards in which they are individually specified. The standard is divided into two main parts: Part 1 lays down requirements for materials and finishes, and Part 2 sets out the detail requirements for specific items. Part 2 is again sub-divided into three sections dealing respectively with fixings for corrugated roofing sheets, fixings for pipes, and sundry other fixings.

Aiding Agriculture

Royal Show, Highlight of countryman's year, presents excellent survey of electrical progress in the Field of Farming

THIS year's Show has had better luck than last year's at Oxford, with its attendant muddy lanes. It opened on Tuesday in the most glorious July sunshine. So favourable was the weather on the opening day that by 11 a.m. over 4,500 people had paid for admission.

Electricity Farm organised by E.D.A. in co-operation with the Eastern Electricity Board sets the keynote for the whole Show. A modern well laid out prefab farm with an attendant prefab service centre includes a complete display under one roof and in its proper setting. The multitude of machines and implements which are on the makers' stands throughout the Show, illustrate an advance in farm efficiency and hygiene brought about by electricity.

Despite the dismay in farming and rural communities generally caused by the recent cuts in capital expenditure and the consequent effect on the extension of electricity supplies into those areas, more and more manufacturers of farming machinery and implements are adopting electricity as the operating power in their designs.

Possibly this is due to the feeling that farmers can get as much power as they require in an economical fashion by installing an independent petrol or diesel electric generating set of one of the many designs that are being exhibited. At least one manufacturer has gone further in displaying a windmill generator; this is the "Freelite" electric plant by Joseph Lucas Ltd., well-known manufacturers of electrical automobile accessories.

Included under the generic heading of power generation and distribution, whether mains or private generation, are many firms. They included R. A. Lister and Blackstone; F. Perkins, of diesel engine fame; A. C. Morrison (Engineers) Ltd., with diesel plants from 1·5 kW upwards for 230 V a.c., and petrol-engined battery charging sets from 250 watts and upwards; Arthur Lyons and Co. (Engineers), with two highly efficient diesel units supplying 2·5 kW or 5 kW. These are entirely self-contained and come into operation when the first switch is made anywhere in the farm. And-Doc, Hampson Industries, Workman Reed, and the English Electric Co. Ltd., show transformers for distribution of electricity supply and relevant fusegear.

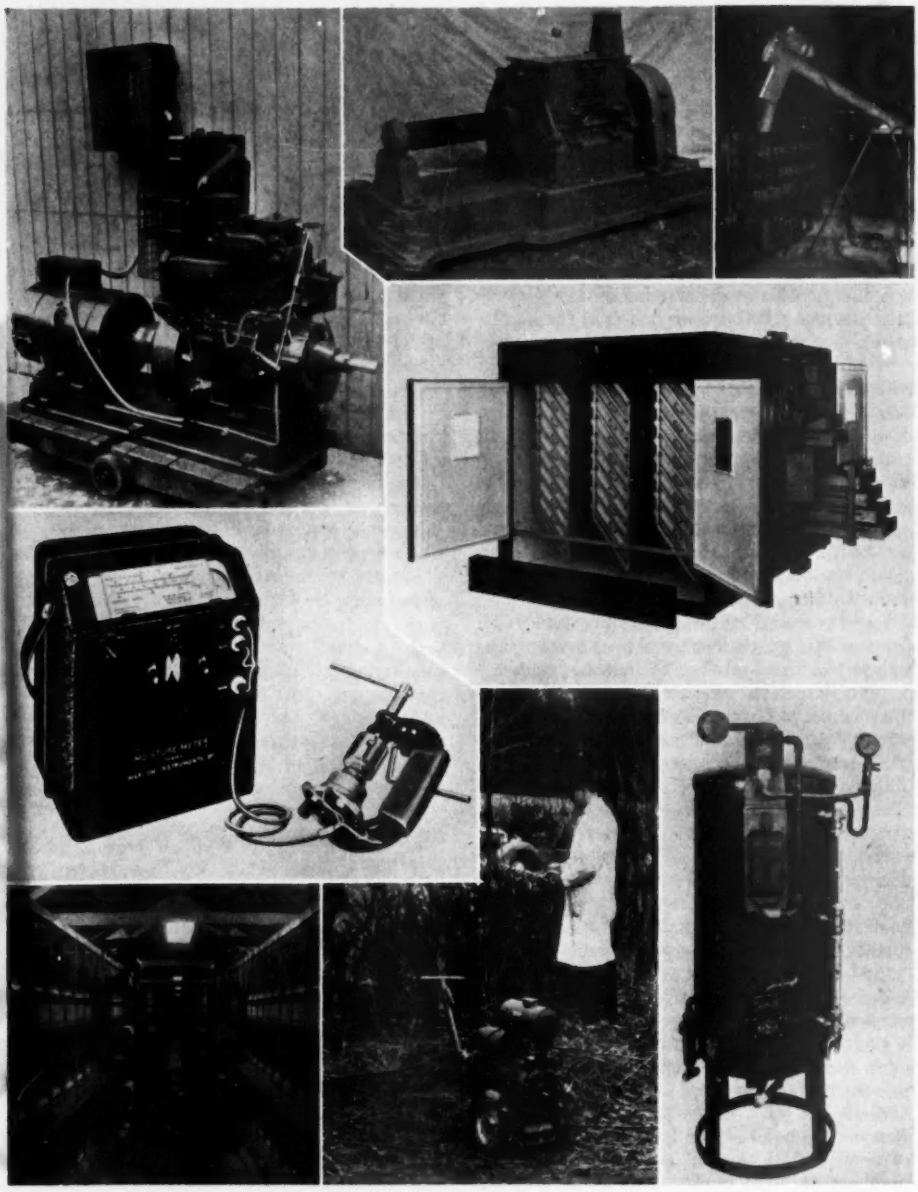
Electric lighting in the farm building is indeed an advance towards the ideal farm, and here the General Electric Co. Ltd. live up to their motto of "Everything Electrical" in presenting an attractive display of lamps and lighting.

Much of the hard work in farming is to be experienced in those operations which normally take place in the barn—grain milling, oat crushing, root and chaff cutting, and grain-drying.

Among leading firms who are showing such equipment are E. H. Bentall and Co., of Maldon, Essex, who have a large display of equipment, most of which is designed for or adaptable for electric drying. A grain dryer with conical heater and motor for 400 V supply is an interesting exhibit, as are the "Wizard" and "Marvel" mills and crushers. A Maxim root cutter and cleaner and a winnower with elevator, are other important exhibits. Christy and Norris, of Essex hammer mill fame, have an important exhibit of barn machinery. We illustrate their latest "Briton" grinder.

Mitchell Colman and Co. show grain handling equipment, the majority of which is for electric operation. Especially interesting is

This distribution substation at the Royal Show comprises Crompton Parkinson Type "A0" high voltage ring main control unit coupled to a Type B 3 D oil-immersed automatic fuse-operated T.A.P. c.b. and a 500 kVA B.E.T. transformer. The equipment has been designed for safe and reliable operation for rural distribution



Some of the products on show. They include': (Top left) An A. C. Morrison generating plant; (top centre) the 120 h.p. Briton grinder by Christy and Norris; (top right) the "Spirolift" grain loader by Mitchell Colman. Marconi's moisture meter and the Papworth Model 175 incubator are below. At the bottom is shown a view of a Whitlock cafeteria laying battery, the Tarpen portable hedge trimmer in operation, and the "Mendip" electric boiler by Clares Service

the Dryvent system of grain drying and storage, where the fan, 20 kW heater and complete electrical control panel are by the firm.

A first-time exhibit on the stand of Penney and Porter is the PW16 "Winnograder" Junior; this equipment can be powered by electric motors and is suited for the smaller farmer. Also exhibited is the "Lincoln" 2-ton grain dryer which, although exhibited as an oil burner, can be supplied with electric heating.

W. L. Hollands are again showing their range of "Adelphi" equipment. This includes mash mixers and vegetable shredders.

Of course, G.E.C. are included under this heading with sack drying units, air heaters and fans.

An interesting application of electricity is the Marconi Instruments moisture meter which measures the percentage of moisture in cereals and other organic substances. A portable *p*H meter shown determines the acidity or alkalinity of the soil as well as milk and aqueous solutions.

Other interesting exhibits are the displays of Scottish Mechanical Light Industries (mills, etc.), and Geo. W. King with the "My-te-men" and other electric hoists.

Usually allied to the barn is the farm workshop, and equipment for use here is displayed by many firms. Murex Welding Processes have displays of welding equipment and accessories, whilst the Quasi Arc Co. are including a mobile demonstration van to back up their display.

Aeraspray compressed air painting equipment has obvious applications, as seen from their display, whilst much woodworking equipment is shown on other stands, including Acrow Engineers with an electric sawbench.

Dairy Equipment

The dairy is a most important place on the farm, and with the need for hygiene and ease in working, most manufacturers of equipment have naturally turned to electricity. Milking equipment, milk cooling, refrigeration and sterilising equipment operated by electricity were well in evidence on the stands of Perkins Clean Milk; J. E. Hall (Chilwell), milk cooler; Vaccar, with their principle of controlled pulsation; Clares Service, who show the H.O. electric sterilising chest (G.E.C.) and a "Mendip" electric boiler together with bottle-brushing machines and automatic fillers and cappers; R. J. Fullwood and Blane have on show their full range of "Fullwood" milking machines. Interesting is the "Midget" milking machine for the small herd. J. W. Woolley, of "Whizzer" and "Electrobloc" fame, show a selection from their range of steam generators, sterilisers and water heaters.

The International Refrigerator Co. have Stand 510, where this year the new SC13 service cabinet is being introduced. There is a range of dairy cold rooms, milk cooling equipment and condensing units, together with domestic and commercial refrigeration equipment.

An interesting exhibit of Frigidaire is the refrigerated air-cooling installation in the stand where the National Sheep Breeders' Association Carcase Exhibition is in progress.

Poultry, although not exhibited at the show, is well looked after, judging from the displays of equipment. Visi Chick Brooder Co. feature particularly an electrically-operated cooling and fattening cage, whilst we illustrate an all-electric cafeteria laying battery by Whitlock Bros. Ltd., of Great Yeldham, Essex, which is being shown on E.D.A's stand. This has a food carrier driven by an electric motor and is fitted with a separate electric cleaning device.

Harvey Laying Battery Co.'s all-metal automatic battery has several new features, including a special safety cut-out switch. Special attention was paid to the "Glevain" radiant heat hover, by Stephens Cabinet Incubator Co. Ltd., whilst the all-electric cabinet incubator displayed by Papworth Industries is illustrated in this article. Other displays are by Curfew Appliances with electric table incubators, Innes Walker, R. J. Palchett, Armitage Units and Auto Feed Ltd.

The farmhouse is just as important electrically as the farm itself, and there are several displays of equipment to ease home cares. Particularly important are the displays of refrigerators and domestic appliances by Eastern Electrical Co., the Servis "R" model washing machine show, Hoover's mobile showroom with cleaners and washing machines, English Electric, Frigidaire and Pye Ltd. with a display of colour television.

Other important applications of power on the farm are to be seen in the displays of pumping equipment by Thomas and Sons (Worcester), Gilbert Gilkes and Gordon (Workington), Simpson, and Arthur Lyons.

The hedge-trimming equipment by Tarpen Engineering is particularly interesting, whilst the Radio Ferret (a ferret radio-locating device by the Wolseley Sheep Shearing Co. Ltd.) is entered for the Silver Medal award. It greatly minimises time lost in digging out the ferret which has gone to ground. Wolseley also show fencing equipment, sheep shearing and cattle clipping equipment. A new invention is an amplifier system designed for installation in the cowshed or other building, when the cries of the animals in labour are transmitted to the herdsman either at his bedside or sitting-room.

overseas news

Plant for S.A.

Under plans of the Government of South Australia, for the development of the Eyre Peninsula (off the west coast), a new power station is being erected at Port Lincoln, but initially two diesel sets will be utilised until steam-driven generators are installed. The first of the latter plant is expected to be in commission in 1954.

Load Control Devices

In Canada, many electricity supply undertakings endeavour to eliminate excessive temporary demand from houses by the operation of extra charges. In Vancouver, for instance, when over 7 kW is used for more than a few seconds, the higher rate is charged up by the special type meters used where electric heating is installed, for the period of overload. To save consumers the greater part of this extra charge, manufacturers have produced equipment which will temporarily cut down, or cut off, the amount of current going into less essential services. Such equipment was exhibited at a two-day forum on electric house heating, sponsored by the British Columbia Electric Co. in Vancouver last month, when the concensus of opinion that these demand control devices, or load limiters, are very effective. The forum was attended by sales and engineering representatives, architects and inspectors. Another demonstration emphasised the advisability of installing adequate service entry equipment, the 100 amp service being put forward as a minimum requirement for a small house with electric heating.

Niagara Station

Construction plans for a second power tunnel at Niagara have been shelved by the Hydro-Electric Power Commission of Ontario, pending the outcome of negotiations on the St. Lawrence Seaway proposal, it has been revealed by Dr. Otto Holden, assistant chief engineer to the Commission. The local development calls for only one tunnel to feed water from the upper river to a new power plant that will be constructed at Queenston.

Ottawa Development

Developments planned by the Ottawa Hydro-Electric Commission were outlined by Mr. F. Plant, chairman, at a banquet last month. These include the establishment of three new large sub-stations, and the enlargement of others. With an estimated revenue of over $5 millions this year, it was proposed to keep tariffs at their present level, now believed to be the lowest power rates for municipal purposes in the world. There was also no doubt about the commission's earning power's ability to meet the annual costs involved in the expropriation of the asset of the Ottawa Light, Heat and Power Co. in January, 1950, he said.

Plant for Toronto

In the course of his visit to this country, Mr. R. H. Saunders, chairman of the Hydro-electric Power Commission of Ontario, cabled his office last week that the first 100 MW steam generator for the Richard L. Hearn power station, Toronto, is now on its way by sea. A second 100 MW set for the station is also under construction in this country by C. A. Parsons and Co. Ltd.

B.C. Project

A hydro-electric power site on the Fraser River is being studied by British Columbia engineers. The project calls for a dam several hundred feet high in a deep chasm of the Fraser at Moran, 170 miles north-east of Vancouver. It would develop 1,500,000 h.p. The Public Works Minister, Mr. E. C. Carson, has said that engineers are now studying potentialities of such a scheme.

Acquisition

Controlling interest of the Northumberland Light and Power Co. and the Cobequid Power Co. have been acquired by the Nova Scotia Light and Power Co. Ltd. The two companies served about 3,000 consumers. Mr. W. I. Snook, manager of the two companies, who played a leading role in their development, is retiring.

An Austrian Scheme

Representatives of the Vorarlberg hydro-electric power stations in Austria have examined a plan to utilise the water resources of the Bregenzerwald between their origin near the Arlberg and the Bodensee. Seven dams are planned to take advantage of the fall of 1,300 metres. Capacity output of these stations would be 530,000 kW, and yearly production would be 1,200,000,000 kW. The latter figure would include 800,000,000 kWh of useful winter current. Germany, who already has a major interest in the Ill, Vorarlberg power stations, is also said to be interested in the new project.

Mysore's Plan

A proposal to increase power generation from the Shimsha hydro-electric station in Mysore State from 17,000 kW to 70,000 kW by the installation of four more turbines, has been sanctioned by the State Government. The project has also been approved by the Central Government. In this connection a reservoir would be located across the Shimsha to impound 5,000

million cubic feet of water. With this expansion scheme completed, the Sivasamudrum power station—claimed to be the oldest hydro-electric installation in India—will be converted into a seasonal station generating power for six months in the year when the flow in the cauvery exceeds 900 cusecs.

Also to begin next October is a survey for a bigger Honnemarudu hydro-electric project across the Sharavai river. This scheme, costing Rs. 300 million, will yield 400,000 kW of electricity.

Pakistan's Need

In the two-year power programme of the Pakistan Government, to which we referred on June 14, it is envisaged that several places in East and West Pakistan will have additional generating capacity. These are Karachi (30,000 kW), Chittagong (20,000 kW), Khulna (10,000 kW), Narayanganj (20,000 kW), Sind (20,000 kW), and the Punjab (25,000 kW). It is understood that the Government is likely to deviate from its policy of setting up power stations itself, inasmuch as it is proposed to induce foreign firms not only to supply the machinery, but also set up the stations themselves. Apparently a number of quotations have already been received from branches or agents of British manufacturers in Karachi, but the Department of Supply and Development feel that advantage could be obtained by further discussion in the manufacturing countries. It is for this reason that Mr. Z. A. Khan has left for Europe and the U.K.

Extension

The General Purposes and Finance Committee of the Kimberley City Council has recommended that authority be obtained to raise £76,000 for electricity development work.

Angola Plan

Work has started on the construction of the Biopo dam and hydro-electric scheme, in Angola, Portuguese South-West Africa, which is intended primarily to supply power to the cities of Benguela, Loluto and Catumbela. Cost of the project is put in the region of 100 million Angolares; the first stage, to supply 35,000,000 kWh per annum, is to be completed in four years.

Light in Africa

In Kampala the need for extending and improving street lighting has been recognised by the Municipal Council and the necessary priorities decided. Orders for equipment worth £21,000 were placed in England, but although some of it arrived before the end of the year no progress on erection had been made because the Uganda Electricity Board could not obtain the necessary staff, according to the annual report of the town engineer.

Power Economy

Although a power cut was averted in Cape Town last week-end, an urgent warning has been issued to the public for economy in the use of electricity.

H.E. Station Design

Arrangements are nearing completion to have two new power stations on the Waikato River designed overseas, the New Zealand Minister of Works, Mr. Goosman, stated recently. These are the Atiamuri station, which will have a capacity of about 50,000 kW, and the Ohakuri station, of 100,000 kW. The Minister said the department was able itself to manage the design of the next station on the Waikato, that at Waipapa. It would construct Waipapa itself and as soon as possible call tenders for the construction of the other two stations. Waipapa, which will be sited between the Maraetai and Arapuni schemes, will develop about 45,000 kW. The Atiamuri and Ohakuri projects will be the next two up river from Whakamaru, the latest on which construction has begun.

Underground Mains

Having earlier agreed to lay an experimental section of underground distribution main, as reported on June 21, the Auckland Electric Power Board has now decided to adopt a policy of underground distribution in the more densely populated sections of its area. The policy applies to both new mains and the renewal and replacement of existing systems. Mr. J. A. Steele, chairman of the board, said the decision would provide a basis for planning future policy. The board would also be guided by the outlying development plan for Auckland prepared by the metropolitan planning organisation. Referring to the matter of replacing existing systems, Mr. Steele said that the board would give consideration to the introduction of underground mains instead of erecting new poles, but the question of economics would also enter into the matter.

Railway Electrification

The New Zealand Government has not departed from its plans for the electrification of the North Island Main Trunk Railway. The Minister of Railways, Mr. Goosman, in reply to an enquiry earlier this week, said there had been no change in the decision the Government made some months ago to electrify the section between Auckland and Frankton Junction, and to agree in principle to the electrification of the remainder of the line between Frankton and Paekakariki. Authority had been given for a full preliminary investigation of the full route.

Lighting in Singapore

The Singapore Municipal Commissioners have approved in principle a second five-year electricity street lighting programme which involves the lighting of over 150,000 yards of street and the installation of almost 4,000 lamps. The plan is to be carried out during the period 1952-1956 and involves an annual cost of approximately Malay $320,000.

PERSONALITIES

IN THE INDUSTRY

The national chairman of the Association of Supervising Electrical Engineers for the 1951-52 session is **Mr. W. F. Parker,** M.I.E.E., technical director of Troughton and Young, Ltd., the vice-chairman being **Mr. L. L. Emmett,** of Leeds, and the honorary treasurer, **Mr. E. J. Sutton.** Mr. Parker received technical training at Birkenhead Technical College and Liverpool Technical College, and served an apprenticeship with Lever Bros., Ltd., Port Sunlight, where he gained experience in electrical maintenance and installation work, including a period as junior control engineer in the company's central power station. Coming to London in 1935 he joined J. Stinton Jones and Partners, and became deputy chief engineer of the Bective Electrical Co., in 1938, being appointed their Midland branch manager later, and chief engineer in 1942. He has been with Troughton and Young since 1945, and was appointed technical director in 1946. He has served on various committees of the Council of the A.S.E.E., was chairman of the North West London Branch in 1948-49, and has actively served the Association in many other capacities.

Mr. W. F. Parker

The Minister of Fuel and Power has appointed **Mr. P. McNab Miln,** B.SC., A.M.I.Mech.E., A.M.I.E.E., of Manchester, to be deputy chairman of the North Western Electricity Consultative Council in place of **Alderman W. W. Cocker,** O.B.E., J.P., M.A., who has resigned from the Council for business reasons.

To be branch manager of the Ipswich branch of the Electrical Apparatus Co., Ltd., to be opened later this month at 9, Camberley Road, Ipswich (telephone Ipswich 77716) is **Mr. L. W. Postle,** A.M.I.E.E., who has been with the company since 1937 and has represented the Eastern Counties area for about four years.

Two appointments are announced by the South Wales Electricity Board. They concern **Mr. C. G. Jeans,** of the secretary's department, who is to be Administrative Officer, Western Sub-Area, Tenby; and **Mr. F. M. Watson,** first assistant, district commercial manager, District 101 (Milford Haven), who is now district commercial manager, District 102 (Fishguard).

Mr. Arthur Makin has been elected to the board of Marshall Sons and Co., Ltd. He has been associated with the company since 1934.

Promoted to Executive Officer (electrical engineering new works and development) at Railway Executive headquarters of British Railways is **Mr. J. A. Broughall,** B.SC. (ENG.), M.I.E.E., who since 1950 has been principal assistant in the electrical engineering, new works and development section. Since 1948 he has been chairman of Policy Committees for standardisation and specification of electrical equipment. After a pupilage and early experience with the English Electric Co., he joined the L.M.S. Railway in 1931, and in 1935 became assistant (generation and distribution). He was responsible to successive chief mechanical and electrical engineers at Euston and Derby for power supply and distribution, including the reconstruction of Stonebridge Park power station, and the conversion of substations supplying the Euston-Watford and Liverpool-Southport electrified lines to 50 cycles and for remote control.

Mr. J. A. Broughall

Mr. A. L. Stock has been appointed managing director of Morgan Crucible Co. in place of the late Mr. H. C. Mills.

Mr. F. J. B. Henderson, B.A., **Mr. C. H. Carslaw,** B.SC., A.M.I.Mech.E., and **Mr. T. L. Mackie,** A.I.Mar.E. have been appointed additional directors of Drysdale and Co., Ltd. Mr. Henderson retains his position of chief of the Purchase Department and Material and Supply Officer; Mr. Carslow held the post of chief designer prior to appointment as technical director, while Mr. Mackie has previously been Scottish representative, sales manager, and sales director.

His many friends in the industry, particularly on the instrument side, will be interested to hear that **Mr. F. H. Batt,** A.R.C.Sc. I., M.I.E.E., is retaining his seat on the board of British Electric Meters Ltd., and has been appointed technical and sales director. We have already reported that a controlling interest in that concern has been acquired by Mr. D. Z. de Ferranti. He thus retains his old and long association with Mr. Denis de Ferranti in the design and manufacture of electricity meters.

Mr. F. H. Batt

The following staff changes are announced by the British Welding Research Association: **Dr. Nicol Gross,** PH.D. (CANTAB), A.M.I.MECH.E., MEM.A.S.M.E., has been appointed assistant director of research. He will continue to be responsible for the Association's engineering researches and will remain in charge of the Research Station at Abington. **Dr. K. Winterton,** PH.D., B.SC., and **Mr. H. E. Dixon,** M.SC., A.I.M., have been appointed chief metallurgists, the former for ferrous metals, and the latter for non-ferrous metals. **Mr. C. L. M. Cottrell,** M.SC., and **Mr. P. T. Houldcroft,** B.SC., have been nominated assistant chief metallurgists for ferrous and non-ferrous metals respectively.

At the annual conference of the Association of Public Lighting Engineers at Brighton this week, **Mr. H. Pryce-Jones,** M.ENG., M.INST.C.E., M.I.E.E., M.INST.F., was inducted as president for the ensuing year. He is, of course, familiar to readers as manager of the Mid-Sussex sub-area of the South Eastern Electricity Board, and as chief electrical engineer and manager to the Brighton Corporation Electricity Department from 1943 to 1948. Born at Chester, and trained at Manchester College of Technology and Liverpool University, he was apprenticed with Met.-Vickers and had experience at sea with the Merchant Navy before joining the Liverpool Electricity Department in 1928. He was deputy city electrical engineer at Liverpool from 1936 to 1943.

Mr. H. Pryce-Jones

Relaxing from more serious matters for a while, four directors of Benjamin Electric, Ltd. attended the firm's annual outing, by special Pullman train to Great Yarmouth, recently. Shown in our photograph, left to right, are **Mr. L. R. Kavanagh,** works director, **Mr. A. E. Iliffe,** sales director, **Mr. H. G. Campbell,** joint managing director, and **Mr. H. L. Smith,** commercial director. The chairman of the company, **Mr. Guy Campbell,** was unable to make the trip as he was on the Continent at the time.

Four Benjamin directors heading for the sea

Next month brings the retirement of **Mr. S. Canniff** from the position of general manager of the Ottawa Hydro-electric Commission. He is to be succeeded by **Mr. G. R. Davis,** now acting general manager and chief engineer.

Now deputy station superintendent at Worcester generating station, Midlands Division of the B.E.A., **Mr. J. Buchanan** has been selected for the post of station superintendent at Nelson, in the North Western Division. He takes up his new duties on August 1.

Newly appointed manager of the Newcastle branch of W. T. Henley's Telegraph Works Co. Ltd. is **Mr. C. St. L. Brightman.** He succeeds **Mr. M. B. Wilson,** who retired last week-end after 37 years' service with the company, during the first twenty of which he was an outside representative. Prior to taking up the managership at Newcastle in 1946, Mr. Wilson was at the Nottingham branch. His services are being retained in a part-time capacity in connection with the branch business. Mr. Brightman, the new manager at Newcastle, joined the company in 1920, and has been an outside representative there since 1933.

Mr. C. St. L. Brightman

Alderman B. J. Watson, A.M.I.E.E., member of the South Eastern Electricity Consultative Council, has been chosen as Mayor of Maidstone for this Festival Year.

Mr. C. A. F. Shapcott, director of Chilton Electric Products Ltd., has now been appointed to the board of the parent company, Chilton Aircraft Co., Ltd.

Another presidency which changed hands last week was that of the Association of Mining Electrical and Mechanical Engineers, for whom **Mr. F. J. Hopley,** chief electrical engineer of No. 7 Area, East Midlands Division of the National Coal Board, fills that office for the next twelve months; he was elected at the annual convention at Malvern. Born in Aldridge, Staffs, Mr. Hopley gained technical education at Walsall Science and Art Institute, and served an apprenticeship with Copy Hall Colliery. In 1908 he became assistant electrician at Birch Coppice Colliery and in 1915 was appointed chief electrical engineer at Rawdon Colliery, subsequent to taking control of the Moira group in a similar capacity. At vesting date he was chief engineer, electrical and mechanical, No. 7

Area, East Midlands Division of the N.C.B., and on the amalgamation of No. 7 and 8 areas he became area chief electrical engineer.

OBITUARY

Mr. A. P. Hayes, A.M.I.E.E., sub-area engineer of the Derby and Burton sub-area of the East Midlands Electricity Board, died on June 28, aged 59. He originally entered the service of the Derby Corporation electricity undertaking in 1908, being, for many years, mains superintendent. When the area was enlarged earlier this year he became engineer to the Derby and Burton sub-area.

Mr. F. O. Everard, M.Inst.C.E., who was for many years works executive director of Belliss and Morcom, Ltd., died on June 25, aged 80. Apprenticed in 1886 to the firm's founder, Mr. G. E. Bellis, Mr. Everard worked for a time as a turner, but quickly progressed to inspecting engineer of the company's outwork, and in 1897 became assistant works manager. He was responsible for the company's large extension, the Electrical Machinery Department, and after being works manager for a time, was appointed works executive director in 1915, from which position he retired in 1948.

Mr. W. F. Mitchell, A.M.I.E.E., consulting electrical engineer, of Edinburgh, died on June 27. He had practised in Edinburgh for a number of years, but earlier had served with the Corporation Electricity Department, being at one time assistant mains engineer.

Mr. C. T. Barlow, O.B.E., a founder-director of Tube Investments Ltd., and of other concerns, died on July 2, aged 75.

Mr. L. A. Wilson, president of the American Telephone and Telegraph Co. since 1948, died on June 28, aged 50.

NEW LITERATURE

The Nomogram

by H. J. Allcock and J. Reginald Jones

AT some time most engineers have used the nomogram as a convenient graphical method of solving an equation, and where a large number of calculations are required utilising the same formula this method has probably no equal for ease and speed of working. Yet on the whole comparatively little is generally known about the construction of these convenient diagrams. One of the "classic" books on the subject, first published in 1932, has now been revised and reissued as a fourth edition, the revision having been carried out by Mr. J. G. L. Michel, of the Mathematics Division of the N.P.L.

Although at first glance the mathematics may appear somewhat difficult to the general reader, in practice, with a little patience and careful attention to the worked examples, the principles are easily appreciated. Some of these examples are incidentally of considerable interest to the electrical engineer. Nomograms are dealt with up to the fourth and higher classes, and a chapter included covering the connection between alignment and intersection nomograms. Published by Sir Isaac Pitman and Sons Ltd., 238 pages, 5¼ in. by 8½ in. Price 18s.

Primary Batteries

by G. W. Vinal, Sc.D.

INTEREST in primary cells has increased during recent years, largely on account of the many portable electronic applications that have been found. Dr. Vinal is well fitted to write on all aspects of the subject, and this present volume should prove most valuable for study and reference. After a short historical introduction, the electro-chemical theory relevant to cell operation is discussed. Dry cells and their operation are next dealt with, then standard cells, and finally some comparatively new types—air depolarised batteries, copper and copper oxide cells, silver oxide and chloride batteries, lead cells, and mercuric oxide and vanadium dry cells. In all cases constructional details are described. There are some notes on the chemical reactions, and use and operational characteristics are dealt with. Published by Chapman and Hall Ltd., 336 pages, 8¼ in. by 5¼ in. Price 40s.

Electrical and Radio Dictionary

by C. H. Dunlap, E. R. Haan, and L. O. Gorder

TECHNICAL terms multiply rapidly, and to a newcomer to electrical matters, and to students generally, this dictionary, with its concise, unstilted definitions, should be welcome. Its use to British readers is somewhat decreased by its American origin, but it has many excellent features unaffected by this drawback. Apart from three word sections—new word section, electrical terms, radio terms—there are illustrations of standard (U.S.) symbols, conversion tables, wiring diagrams, and much similar matter. Published by the Technical Press Ltd., Gloucester Road, Kingston Hill, Surrey, 133 pages, 8 in. by 5 in. Fourth edition, price 14s.

BOOKS RECEIVED

Electrical Engineering Theory and Practice, by P. Kemp. Comprehensive outline textbook for young engineers: a successor to Pitman's "The Electrical Educator." Published by Pitman, 3 volumes, 1,964 pages, 9¾ in. by 7 in. Price 210s.

E.D.A. Domestic Refrigerator Handbook. Practical notes on installation and maintenance. Published by the Electrical Development Association, 2 Savoy Hill, London W.C.2, 150 pages, 7 in. by 4¼ in. Price 5s.

A Short History of the Science Museum, by F. Greenaway. Published by H.M. Stationery Office, 18 pages, 9½ in. by 6 in. Price 1s.

RECENT RESEARCH REPORTS

Magnetic theory, dielectrics and interference phenomena are amongst the subjects discussed in some E.R.A. publications

MANY aspects of electrical engineering are touched upon in the 13 technical reports which the E.R.A. has issued for publication during the past few weeks. Prominent as a subject is ferromagnetism, and four reports deal with matters related to it.

The most generally interesting of these is N/T60, in which Mr. K. H. Stewart describes work carried out at the Cavendish laboratory, under the direction of Dr. D. Schoenberg. Its title, "Losses in Electrical Sheet Steel," gives only a clue to the subject, which is an investigation into discrepancies between the "classical" theory of eddy current losses and the measured losses.

Classical theory states that loss per cycle is proportional to $(B^2_{max} \times a^2 f) \div \varrho$, where B_{max} is the maximum flux density when the iror of resistivity ϱ and thickness a is magnetised by an alternating current of frequency f. This formula is based on the assumption of constant permeability and resistivity throughout the iron.

Extra Loss

For actual measurement, the total loss in steel sheets at two or more frequencies is determined, and the loss at zero frequency (found by extropolation) is taken as the hysteresis loss (independent of thickness and frequency). The remainder, when this is subtracted, is taken as the eddy current loss—and it commonly exceeds the value given by the formula quoted. The question at once arises, can the discrepancy be allowed for by some modification of the classical formula, such as that which would be introduced by abandoning the assumption of uniform permeability?

Mr. Stewart attacked the problem by using commercial sheet steel annealed in a vacuum at 1,250° C, which gives a relatively small hysteresis loss and eddy current loss, and an "extra" loss of about 40% of the total loss. Measurements were then made to determine loss variation with frequency, flux density, thickness and temperature, and an attempt made to interpret the results in terms of variation of permeability and of a time lag between B and H.

The conclusion reached is that the frequency-dependent part of the loss in sheet steel cannot entirely be accounted for by the classical eddy current mechanism. Modifications to this mechanism, taking account of permeability, can explain some of the discrepancy, but part remains. This extra loss appears to be due to the slowness of domain wall movements; it is not clear whether this is caused by microscopic eddy currents or by some other forms of friction.

Domain Theory

More theoretical matters are the subject of the other reports on magnetic subjects. The first of these is N/T55, in which Professor L. F. Bates and Mr. F. E. Neal deal with the use of the Bitter powder pattern technique in the determination of the domain structure of single crystals of silicon iron. Early work concerned with qualitative aspects of the subject and with the development of techniques is first described, and then the quantitative results obtained are discussed with reference to their relation to the theory. Suggestions are made for refinements in future experiments.

Single crystals are again discussed by Mr. K. H. Stewart in N/T59 "Domain wall movement in a single crystal." The measured speed of domain wall movement is compared with that predicted by theory. It was concluded that the speed of wall movements in the specimen examined were controlled by eddy currents, the effects of other retarding forces being negligible in comparison. Finally in this group of reports comes T/58 "The domain structure of ferromagnetic crystals," in which Mr. H. Lawton discusses powder patterns formed when a specimen cut from a single crystal of silicon iron is examined by the powder pattern technique.

Interference

Interference measurements on appliances producing discontinuous interference are described by Messrs. S. F. Pearce, B.Sc., A.Inst.P. and H. Goldenberg, B.Sc., in report M/T100. Discontinuous interference is defined as including "clicks" occurring more frequently than once in every two minutes, and the condition for interference-free operation is that the mean value plus the standard deviation of a number

of measurements shall be equal to or less than $57 + 10 \log_{10} \frac{N + 16}{N}$ db up on 1μV where N is the average number of clicks in one minute.

A sequential method of testing appliances is suggested which will reduce the amount of inspection involved and, moreover, closely relate the amount of inspection to the degree of suppression provided. This sequential plan requires no calculation, and calls for a record of the total number of readings and the number exceeding the given tolerance level only, instead of all readings individually.

Electrostatic induction between power lines and telephone lines is the subject of report M/T109, written by H. R. J. Klewe, Ph.D. Discrepancies which have been generally observed between measured values of the induced voltage or current and values calculated by accepted methods are attributed in this report to the existence of stray capacitances which are generally neglected in calculations based on line dimensions but are of important magnitude. The cause of the discrepancies may be masked by the presence of harmonics in the voltage source from which the lines are energised during measurements. The conclusions are supported by measurements made on experimental lines.

Dielectrics

Outstanding for practical interest amongst the reports on dielectrics is L/T237 "Tracking in solid insulating materials: method for testing susceptibility to tracking," which is based on the work of Messrs. W. J. Grant and G. C. Ives and is edited by Dr. V. E. Yarsley, D.Sc., F.R.I.C. It is stated that the features desired in any new method proposed are: that test results shall be capable of interpretation in terms of the behaviour of the material used under service conditions; that results shall be quantitative, precise and reproducible; that results shall be capable of comparison with results obtained by existing methods; that the method shall be simple and easy to perform; and that the test apparatus shall be simple, cheap and readily available.

The method finally proposed uses a salt-solution dropping jet with controllable drop-rate, and delivers this to about a central electrode. An outer annular electrode of 0·4 in. inner dia, 0·2 in. thickness surrounds it. The saline solution consists of 2·5 gm pure sodium chloride and 2·5 gm of "Teepol X" (a commercial detergent) diluted to 1 litre. Drops of solution, each weighing 0·024 gm, are allowed to fall every 8 seconds, and the number of drops to bring the tracking current to a specified value is deemed to be a measure of the tracking resistance of the test specimen.

Some idea of the speed of test is given by results obtained—cast phenolic plastics, 4·5 drops; moulded wood-filled phenolic plastic, 10 drops; moulded mineral filled phenolic plastics, 17·1 drops; moulded mineral filled melamine resin, 200+ drops.

Perhaps of less everyday importance, but still of theoretical interest, is L/T245 "Static discharge characteristics of dielectrics," which records some work carried out by Professor B. Gross of Rio de Janeiro while he was visiting England under the aegis of the British Council. The formation and behaviour of true charges on dielectric surfaces was studied, with a view to obtaining information on their nature and distribution. Explanations are reached for the phenomena observed which concur with theories of internal and external discharges described in other E.R.A. reports.

Cartridge fuses and intrinsically safe apparatus are the subject of two section G reports which complete the selection under review. The first of these (G/T245) is the joint work of Messrs. H. W. Baxter, B.Sc.(Eng.), A.M.I.E.E. and M. T. Cree, and discusses the influence of circuit constants and fuse design on the a.c. arc reignition voltage of cartridge fuses. The conclusion is reached that normal variations in the self-capacitance of circuits is unlikely to have any significant effect on the breaking capacity of fuses. It is, however, noted that a fuse that persistently fails with small currents may clear the circuit if a capacitor is connected in parallel with it. With currents above 10 amp the capacitor becomes impracticably large. Filler grain size and the point on the sine wave at which arcing begins do not affect reignition voltage.

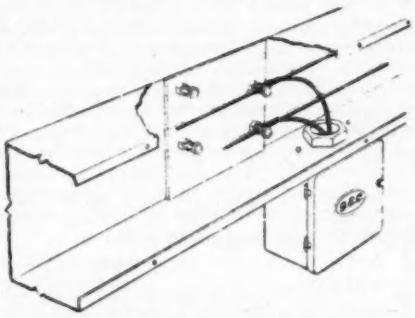
Report G/T232 has intrinsically safe electrical apparatus for its subject and in it Messrs. E. M. Guénault, M.Sc., Ph.D., and E. Atherton produce the results of experiments with pentane, hexane, heptane, and acetone. These show that the relation of minimum igniting current to circuit inductance, for the most readily ignitable mixtures with air of the vapours mentioned is, in each case, very similar in form to that observed for methane.

Reports reviewed above are obtainable from the E.R.A. at Thorncroft Manor, Dorking Road, Leatherhead, Surrey, at the following prices, including postage.—N/T60 7s. 9d. N/T59 3s. 3d. L/T237 6s. 3d. G/T232 4s. 9d. N/T55 18s. 5d. M/T100 12s. 3d. L/T245 18s. 5d. G/T245 7s. 9d. N/T58 6s. 3d. M/T109 12s. 3d. L/T243 4s. 9d.

The BUYER'S *Column*

Cable Trunking with Fused Tap-Offs

A CABLE trunking system which combines simplicity of installation with the maximum flexibility of distribution is now available from THE GENERAL ELECTRIC CO. LTD., Magnet House, Kingsway, W.C.2, for use in machine shops, workshops, etc., where the total power consumption does not exceed 100 amp per phase. Fused



This diagram illustrates the simplicity of the G.E.C. cable trunking system

tap-off units can be fitted at any point from which connection has to be taken to a machine, so that even when changes are made in the shop layout the units can be shifted so as still to be adjacent to the machines they control.

To tap off from the v.i.r. cables in the trunking at any point, a special terminal block, which enables the main cable to be tapped without cutting, is fitted inside the trunking. It is only necessary to remove the insulation from the cable and secure it with the special terminal on the block. The trunking is drilled at this point, and a fused tap-off unit is fitted and wired to the terminal block. Connection to the machine is made by cable from the tap-off unit. All drilling and fixing can be carried out on site after the most suitable positions for the machines have been chosen.

Saving Current Costs

NOWADAYS, when economy in expenditure is of paramount importance in view of the vicious spiral of rising prices, all methods of saving the pennies without reducing our standards are viewed with more close attention than before.

Firms and individuals worried about the increases in their fuel and power bills would do well to follow the example of the Festival of Britain authorities, who have adopted the use of "Eeto" cylinder jackets for use in all the hot-water systems.

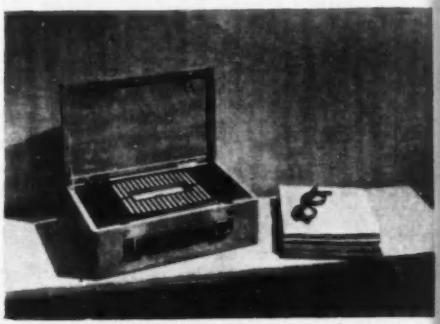
These jackets are easy to instal and are reasonably priced. In the view of the manufacturers it is more expensive to do without an "Eeto" jacket than to buy one. Made to fit all shapes and sizes of cylinders, these jackets are made by EETO INSULATIONS, River Street, Bolton.

Ending the Daily Man-Hunt

AN interesting system of staff location, one of the latest advances of the company, was on view at the recent Business Efficiency Exhibition at Olympia, London.

It is the "Man Hunter" staff locating system, designed and produced by BLICK-TIME RECORDERS, LTD., 188/190 Grays Inn Road, London W.C.1. Extremely simple in design and function, yet highly efficient, the system involves the use of flashing numerals on the faces of a master clock system.

Bearing in mind that the object that most people look at more than any other thing is the clock, the company devised a system involving flashing or continuous lights behind the figures on the clock face. Arrangements can be made to light all 12 numerals on the clock face, thus giving a total of 4,095 different call signs. The executive who is the subject of the search, on seeing his call



Ferranti's 815 for listening where it's wanted

code, gets in touch with the telephone operator or receptionist who controls the system.

Normal practice for the economical use of this system in a small firm is to use a combination or combinations of the figures 3, 6, 9, 12; in this way a total of 15 different call signs is possible.

Ferranti Tone Wherever You Go!

ROUGHLY the same size as a vanity case and weighing only 8 lb complete with batteries, the new portable radio receiver model 815 permits complete trouble-free Ferranti listening wherever you may be.

Set in a miniature suitcase finished in lizard or maroon leather cloth with a strong plastic handle, the Model 815 is a four-valve superhet for medium and long waves, 187-550 m and 1,000-2,000 m.

Mazda Cinderella Disney Lights are packed in an attractive carton

Its 6½ in. high flux density p.m. speaker gives exceptionally good tonal quality. Frame aerials are built into the lid, which is coupled to an automatic on-off switch.

Normal h.t. 90 V and l.t. 1·5 V miniature dry batteries are used. Price is £15 15s. (tax paid), without batteries.

I.M.E. Equipment for Instrument Repairs

PRECISION drilling machines designed particularly for the instrument, watch, clock and jewellery trades, are a speciality of the IDEAL MACHINE TOOL AND ENGINEERING CO. LTD., 282 Kingsland Road, London E.8.

Outstanding features of the "I.M.E." drilling machine are many. The spindle is of nickel chromium steel, precision ground to take 8 mm split chucks, downward movement being by means of a hand lever connected to spindle by a split bronze collar. The bearing is in one piece, obviating any misalignment; dust covers are provided with enclosed felt oil wipers for protecting the bearing. The pulley is stepped for three speeds, belt being tensioned by adjusting the jockey pulley. The table is adjustable and is locked by a knurled screw. The drawbar is provided with a hardened ground revolvable conical seating, which eliminates side play, and the foot being the same as that supplied with the "I.M.E." lathe, allows quick interchange.

New Electric Blanket

A RECENT introduction by the WARM GLOW CO. LTD., 1,133 London Road, Leigh-on-Sea, Essex, is the "Vigilux" electric blanket.

This new design represents the last word in sleep luxury. It incorporates a special thermostatic system by which the temperature of the bed set to any desired level between 85° F and 130° F is automatically adjusted when changes in bed conditions, air temperature or mains voltage occur.

The bedside control is a small lightweight unbreakable plastic box, which will not scratch furniture. The blanket is switched "on" and temperature set by a single control knob. (Twin controls are provided for the double-bed size, each half being heated independently.)

The blanket, which is made as a fleecy blanket in full bed sizes, costs a few pence a week to run, can be immersed in a wash tub, waterproof elements being provided, and does not interfere with radio and t.v. reception. Five colours—white, rose, blue, peach and green—are normally available.

Cinderella Disney Lights

INTRODUCED at a date coinciding with the general release of the R.K.O. Radio film *Cinderella* are the novelty Mazda Cinderella Disney lights by BRITISH THOMSON-HOUSTON CO. LTD., Crown House, Aldwych, W.C.2.

These lights are being featured in cinema foyers in all parts of the country as a tie-up with the film and add an appropriate air of festivity to the scene.

Colourful designs by Disney artists, based on scenes from the film, give the lighting sets an unmistakeable identity. Each set supplied with a spare lamp has a list price of £1 10s., to which purchase tax 7s. 6d. must be added.

Price Increases

FURTHER announcement of increases in prices comes from BYLOCK ELECTRIC LTD., South Street, Ponders End, Middx., who have raised the price of the streamline hair dryer to £3 19s. 6d. and the A.M. industrial blower £4 7s. 6d. as from June 1. All orders actually booked at June 1 are being executed at the old prices.

TRADE PUBLICATIONS

CABLES.—We have received from W. T. Glover and Co., Ltd., Trafford Park, Manchester 17, copies of their new catalogues which are bound in a useful and indeed attractive loose leaf cover in blue linen. The component catalogues cover a range of cables from 22,000 V three-core cables, centre point earth trailing cables for mining purposes, rubber insulated cables and flexible cords. A brochure on the manufacture and behaviour of the Glover pre-impregnated solid type super tension cable and one on Glo-Clad wiring system accessories are included.

SAFETY CLOTHING.—J. and R. Fleming Ltd., 146 Clerkenwell Road, London E.C.1, are specialists in the provision of protective clothing respirators and goggles. They have recently issued a booklet listing some of their products.

MACHINE TOOLS.—"V" spline hobbing machines by David Brown Machine Tools Ltd., Britannia Works, Sherborne St., Manchester 3, are described in a recent leaflet by the company.

RADIO RECEIVERS.—A broadsheet giving a general description of the latest Ekco "Stroller" mains/battery portable receiver is available from E. K. Cole Ltd., Southend-on-Sea, Essex.

ECONOMISER CONDENSERS.—These are one of the specialities of G. and J. Weir Ltd., Cathcart, Glasgow S.4. A new publication on this subject is available from the company.

METAL-CLAD SWITCHGEAR

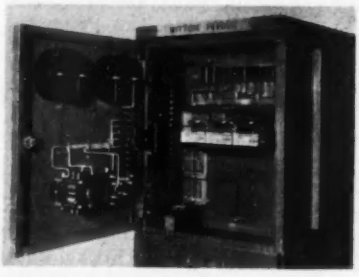
New G.E.C. design for Air-insulated or Compound-filled busbars

General view of unit with the breaker carriage withdrawn from its housing

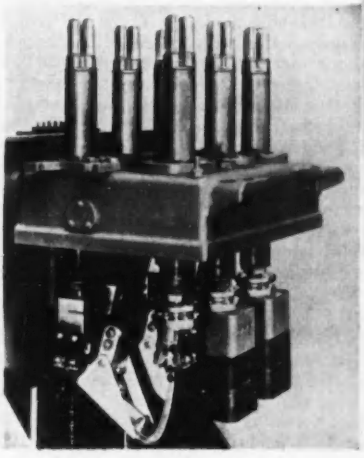
NEW single bus metal-clad vertical plugging switchgear recently announced by the General Electric Co. Ltd. has an assigned rupturing capacity of 150 MVA at 6·6 or 11 kV. Known as the type K4, it is designed in 400 and 800 amp ratings for either air insulation or with compound filled busbars and oil filled current transformer chambers.

The stationary unit is a steel cubicle with top and rear removable covers, and upper and lower doors in the front, the upper door forming a hinged instrument panel. As will be seen from the illustration, protective relays are normally mounted behind the panel. The lower door gives access to the movable unit carrying the circuit-breaker, which is raised and lowered by a vertical screw operated from a removable handle through bevel reduction gear.

Busbars are arranged in triangular formation in steel chambers for the compound filled gear, band joints being used between adjacent equipments. In air insulated gear, busbars are arranged in vertical formation. Insulating barrier supports are utilised in both types.



On left: Instrument panel in open position. On right: Circuit-breaker contacts, one pot removed



Circuit-breakers

The OCB is of the single break type, with side-blast arc control pots, with a rectangular tank and a deep box section top plate, to act as an expansion chamber and also accommodate the operating mechanism and dash pots. Hand, solenoid, or spring operation can be fitted, emergency hand operating facilities being provided in all cases. The operating mechanism is enclosed in a compartment on the front of the breaker carriage.

Isolation is accomplished through plug and socket contacts, with self-aligning plugs, the number of plugs depending upon the current rating of the circuit.

Current transformers are mounted upon the stationary unit, the C.T. chambers being oil filled for the C.F. units. Voltage transformers, when required, are mounted on top of the unit, with h.v. fuses and current-limiting resistors, arranged for horizontal isolation.

Secondary connections between fixed and moving units of the gear are made through flexible connections (enclosed in flexible conduit) and have plug connectors which remain coupled until the breaker is lowered to within 2 in. of its lowest position before they are automatically withdrawn. This facilitates testing of both trip circuits and breakers while in the isolated position.

The gear is fully interlocked and provided with the normal complement of safety devices.

THE WEEK

COMMERCE *in news* INDUSTRY

Allocation of Scarce Metals

TEMPORARY arrangements to offset bottlenecks in production caused by shortages of steel, zinc, copper and alloys, pending the introduction of detailed allocation schemes, were announced last week by the Chancellor of the Exchequer and Minister of Supply. Broadly, the arrangements provide that defence orders, essential export orders and important home contracts will not be held up through lack of these materials.

In the case of all contracts under the rearmament programme, a D.O. ("Defence Order") symbol and number will be allocated with the order, and should the manufacturer or subcontractor be faced with a hold-up, he will be able to apply under the number for a special allocation of metal. A similar scheme will operate as regards important export orders and essential civilian production, including fuel and power programmes, which involves the allocation of a P.T. ("Preferential Treatment") symbol. The arrangements will apply only to a small number of cases of particular importance and difficulty, and are temporary. The intended allocation system is being prepared but will not be finalised and brought into operation for some months, probably not until the New Year. Suppliers of the materials affected have been asked to set aside small quantities to meet the urgent demands, probably between 6% and 10% of their total stock.

Radio Service in Red Sea

A RADIO telephone service was inaugurated at Aden a few days ago, whereby ships in harbour or within 50 miles of the port will be able to communicate with the shore. Cable and Wireless Ltd., in conjunction with the Aden Government Telephone Service, are responsible for this new development. The company has taken over two wireless stations on the island of Kamaran, about 200 miles from Aden, and will combine them. The first consists of a quarantine wireless station operating a ship-shore service, and a point-to-point telegraph service with the Cable and Wireless station at Aden. The second is an aeronautical station providing airguard service and point-to-point communication. The new service will operate for one hour each morning and afternoon.

The Gap is Wider

PROSPECTS of more power cuts next winter are already hitting the headlines. At a meeting of the E. Midlands Consultative Council last week it was stated that a reduction of 25% in the peak load was necessary and that appeals for economy would be made immediately autumn sets in. Asked whether "the gap" was better, the same or worse today than it was a year ago, Mr. L. J. Jeffries, divisional controller, said the position was slightly worse. With the large programme of new stations in hand the gap was likely to be overhauled quicker. He said that provided there was no cut in capital epxenditure, and the rearmament position did not prejudice priorities in capital and labour, the situation would improve more rapidly. The Council approved a resolution urging the Board to do everything possible to impress on the Central Authority and M. of F. and P., the necessity for speeding up the programme of new generating plant and the immediate removal of all restrictions which might impede the production of that plant.

End of Dollar Exports Board

AS foreshadowed in our issue of April 26, the work of the Dollar Exports Board as a Government-assisted agency for promoting trade with North America has terminated. The Board as such ceased to function on Saturday but was immediately replaced by the Dollar Exports Advisory Council, which will be directed, financed and staffed by the organisations which had previously sponsored the Board. There will, however, be no Government participation. Sir William Rootes is chairman of the Council, and we note that Sir Cecil Weir, formerly chairman of the Board, has accepted an invitation to be co-opted to the Council. Firms, companies and persons with dollar market problems are invited to send them to their own national organisations or to the secretary of the Council. The new concern will be situated at 41 Buckingham Palace Road, S.W.1.

Problems of Transport

PRINCIPAL speaker at the Batti-Wallahs' luncheon last week, Lord Hurcomb gave a short address on "Some Problems of Transport." He began by giving some idea of the magnitude of the business undertaken by the Transport Commission.

The First Half-Century

Coventry. The rise in the price of coal has had a very bad effect upon the results of the year's working of the Electric Supply Undertaking. The report of the Electric Lighting Committee states that the number of customers has increased from 226 to 331 during the year and the lamp connections from the equivalent of 17,806 of 8 candle power to 23,637.—*From our issue of* 4 *July*, 1901.

In addition to the railways, this included docks, road passenger services, road haulage, hotels, shipping, advertising and a travel agency. The receipts of these amounted to about £550 million per year, and the deficiencies were therefore only 2½% to 3% of the receipts.

Day-to-day management was dealt with by various executives, and as far as possible the local companies had been allowed to retain their own identity. The Commission only dealt with general questions of policy and labour relations. On the more general question of public ownership, he thought that the conception of a public corporation such as the Central Electricity Board was a good one. If a departmental arrangement was set up, its finances automatically became part of the budget, and it could be made answerable on all matters to Parliament.

Referring to costs, Lord Hurcomb pointed out that transport rates could not be raised without going before a Tribunal, and by the time assent was gained, rises in prices of materials and labour had nullified the anticipated increased revenue. Certain economies could be made, however. The backbone of the railway services was in general not only economical but profitable, but many branch lines were not. These could be eliminated and road transport substituted. Finally he appealed for more elasticity of mind on the part of both the staffs of the executives and traders. Transport was indispensable, and if the organisation failed, the burden would fall on the taxpayer.

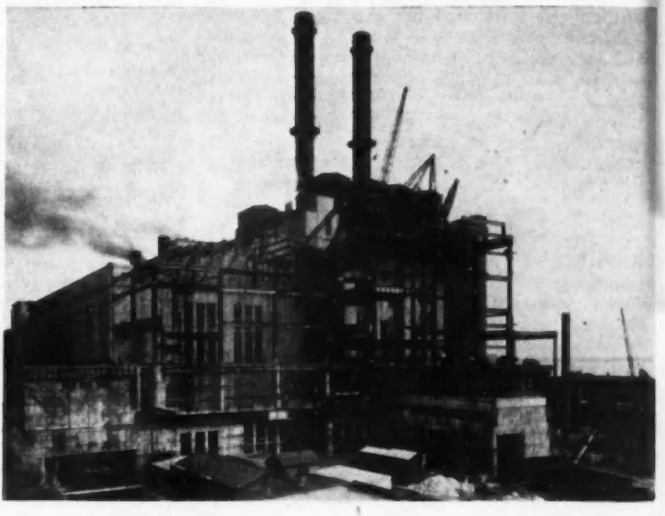
Students Touring France

A FULL programme of visits and engagements has been planned for 20 members of the students' sections of the Institute of Electrical Engineers who are now touring France. The party left by air for a fortnight's round trip last week-end and are due to return on July 15. During this time they will be the guests of M. Laborde of Electricite de France, who is making all arrangements in collaboration with the Office du Tourisme Universitaire. The members were guests of the Societe Francais des Electriciens on Monday. Among highlights of the students' tour are likely to be visits to the Paris-Dijon Electric Traction system, the hydro-electric power station of the Company Nationale du Rhone at Genissiat, and the factories of Cables de Lyon and Le Musee Ampere at Lyons.

A.P.L.E. Conference at Brighton

PRELIMINARY details have been announced this week of the annual conference of the Association of Public Lighting Engineers, which is to take place at Brighton between September 18 and 21. It is anticipated that over 1,000 delegates will attend, comprising representatives of local authorities throughout Great Britain, the Electricity and Gas Boards and a number of visitors from overseas. All the conference sessions will take place in the Dome, but besides the papers to be presented, delegates will be able to inspect concrete and steel lamp columns with appropriate electric and gas lanterns which are to be exhibited in Madeira Drive.

The first morning will consist of the annual meeting, induction of the president, Mr. H. Pryce-Jones, the official opening by the Mayor of Brighton and the presidential address. During the afternoon Mr. C. C. Smith will read his paper on "Maintenance, Organisation and Methods." Papers on Wednesday are entitled "Four Problems in Traffic Route Lighting," by Mr. W. R. Stevens, and "Fluorescent Street Lighting in France," by M. L Gaymard. The one paper to be given on Thursday is "Design of Street Lighting Equipment," by Mr. P. Crawford Sugg, and on the final day Mr. P. M. Davidson will deal with the materials used in street lighting installations. Other features of the conference will be the civic



Some indication of the progress made with the Bunnerong "B" power station extensions in Sydney may be gained from our illustration. A fourth 50MW Parsons turbo-alternator, with two 300,000 lb/hr Simon Carves boilers, is now being installed. To date 75% of the boiler parts have been delivered and the turbo-alternator is being assembled for final works test. We understand that the Sydney Electricity Undertaking is highly appreciative of British efforts to supply this urgently needed plant

reception by the Mayor and the president's reception on Tuesday and Thursday evenings respectively, a tour of Brighton's installations on the evening of the 19th, and the annual luncheon on Thursday.

Power Cuts Warning by Radio

TESTS carried out earlier this year by the Yorkshire Electricity Board on a radio warning system to indicate when power cuts are imminent, have proved successful, and it is proposed to operate the system next winter provided sufficient consumers co-operate. Details of the scheme and subsequent progress were given in our issues of February 15 and March 22 respectively. Signals will be transmitted from a central control which would operate a relay in a radio receiver, giving warnings that cuts were likely within two or three minutes. The actual signal would consist of a warning bell circuit, or could be arranged to work jointly with any existing public address system.

The cost of the receiver is now definitely stated to be in the region of £50, and the Board is prepared to supply these at cost price. In addition the consumer will have to bear the cost of erection of suitable aerial and wiring, and also the licence (10s. p.a.) necessary for each receiver installed. The Y.E.B. has undertaken to carry out individual tests to ensure that an adequate signal would be received before accepting an order. The scheme will cover all areas except Hull and Grimsby, and all interested consumers are asked to contact the Board as soon as possible.

The De La Rue Exhibition

"DELARON," "Formica," "Traffolyte" laminated boards and products, and a wide range of extruded plastics formed only a part of the De La Rue Exhibition which opened at 26 Conduit Street on July 2, and is intended to give some idea of the firm's many activities, ranging from banknote and stamp printing to plastics, playing cards and gas appliances. One of the most interesting exhibits is an envelope-making machine, which caused a sensation at the 1857 Exhibition and is still in good working order, being shown in operation. Another interesting point is that the exhibition has been assembled almost exclusively from materials manufactured by the company.

Industrial Relations

REPRESENTATIVES of 23 countries met at Cambridge last week to exchange opinions on and discuss personnel management in Britain. Special emphasis was laid on the part played by trade unions and on joint consultation. The conference was arranged by the Institute of Personnel Management and was the first arranged primarily for overseas visitors. Among those who interpreted British views on industrial relations was Mr. R. D. V. Roberts, secretary of the National Joint Advisory Council of the Electricity Supply Council.

Views for and against New Tariff

THE Midland group of Socialist M.P.s, through their chairman, are to ask the Midlands Electricity Board for a fuller explanation of the new tariffs due to come into force as from the next meter readings. Having discussed the new charges the M.P.s have concluded that they are unfair and likely to prejudice the small consumer. In addition the Gloucester City Council has agreed to support West Bromwich's protest and have appointed a representative for the protest conference of local authorities. It will be recalled that following the Board's publication of the new tariff, severe criticism was expressed on the grounds that it was drastic, unfair and unjustified (see our May 31 issue). It was suggested that the M.E.B. should satisfy consumers by statistics that the increases were necessary, before the tariff became operative. On the other side of the picture, Walsall Trades Council has rejected a resolution protesting against the new charges. It was stated that where a genuine attempt was being made to make charges fair for everyone, it was wrong to object. An attempt was being made in the right direction, said the secretary.

B.E.A. Pension Scheme?

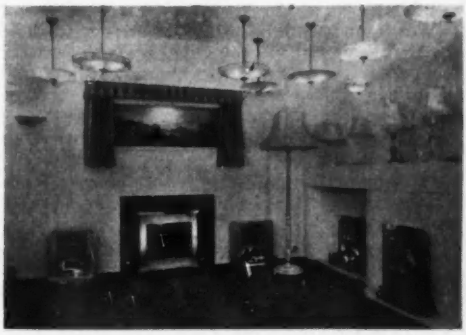
THE annual conference of the Amalgamated Engineering Union decided by 41 votes to 11 last Friday to take steps to negotiate with the B.E.A. a comprehensive superannuation scheme covering all its electrical employees. It was stated, however, that the executive council had already approached the B.E.A. on the subject but did not think that the Minister of Fuel and Power would agree to a scheme for either electricity or gas workers until details of the miners' pension scheme were settled. These are expected to be announced this week.

Mine Lighting Reviewed

"LIGHT and the Coal-Miner" is a new publication just received from the Lighting Service Bureau. It gives a clear idea of the necessity of adequate mine lighting, and the many difficulties and obstacles which militate against its provision, together with consideration of the means of overcoming these difficulties and the beneficial effects upon health, safety and production. The booklet can be obtained by interested persons from the Lighting Service Bureau, 2 Savoy Hill, W.C.2.

E.D.A. reissue "Cold Cookery"

E.D.A. have just issued a 1951 edition of their pre-war best-seller, "Cold Cookery," revised to line up with modern catering conditions and including a weights and measures table based on the B.S.I. measuring cup. A considerable amount of information is given on how to get the best out of a refrigerator, in addition to 35 pages of actual recipes, in which an acknowledged expert on cold cooking, Ursula Jackson of Electrolux, co-operated. The book is obtainable at 2s. 6d. from the Electrical Development Association at 2 Savoy Hill, W.C.2.



Two views of Berry's electric showrooms in Manchester showing (above) a range of 20th century appliances, and (right) the entrance hall showing access to three of the five showrooms

Managerial Grades Representation

SETTLEMENT in the protracted negotiations concerning the "4th Leg" agreement in the 1947 Electricity Act was reported at the annual general meeting of the Association of Managerial Electrical Executive last Thursday, when Mr. A. E. Morgan, the newly elected president, reported that under the agreement a National Joint Managerial and Higher Executive Grades Committee will be set up with six sub-committees. The A.M.E.E. will have sole representation on the No. 1 managerial sub-committee, which will cover grades rising to over £1,500 p.a., and will be represented on the other sub-committees, with the exception of that dealing with power station superintendents. The other panels will provide for staff falling outside the N.J.B. and N.J.C. schedules not covered by panel No. 1. District managers with salaries of £1,000 and above are included in panel No. 6.

Mr. Morgan also stressed that the A.M.E.E., as reconstituted, has opened its ranks to non-engineers with suitable qualifications or appropriate training and experience, holding executive appointments with managerial functions in the electricity supply industry. With the new negotiating machinery it is essential that all grades should be adequately represented. Although it is not the policy of the Association to engage in an active recruiting campaign, as it is desired to retain the more individualistic and specialistic nature characteristic of the A.M.E.E., it does invite the support of those in non-engineering professions. Protection of its members is also afforded by the Association.

New Manchester Showroom

A REPORT from Manchester this week reveals the great strides made by the branch of Berry's Electric Ltd., since their move last year to new premises at 66 Mosley Street. The decoration and fitting-out of the five separate showrooms has now been completed and the great success achieved is clearly indicated in our accompanying illustrations. The large amount of space available facilitated the grouping of fires and lighting fittings in appropriate settings; thus appliances of the Tudor, Queen Anne, Regency periods and 20th Century, all drawn from the company's normal range, have been assembled in their own exclusive alcove. One particular feature of these displays is that they give the impression of personal attention and careful allocation rather than that they have been stocked to comply with production at any given time.

Education Bulletin

DR. ERIC BRADSHAW, the Organiser, has collected together for the latest issue of the "Bulletin of Electrical Engineering Education" a more than usually wide range of articles, as well as the normal collection of laboratory experiments. Subjects covered extend from linear network equations and complex permeability to the fundamental principles of electric fuses and protective gear principles. Further details of the Bulletin may be obtained from the Organiser at the College of Technology, Manchester 1.

Domestic Use of Electricity

AS we go to press, we have received Mr. Leslie T. Wilkins' Social Survey on the use of domestic heating appliances and the money spent on coal, gas and electricity during the year 1948-49. Data, obtained from numerous sources and assembled to provide estimates on the above subjects, was collected in November 1948 and July 1949. It was published by the Central Office of Information. We hope to deal with the Survey in greater detail next week.

Delegates' Outings

DELEGATES to the 1951 Convention of the Association of Mining, Electrical and Mechanical Engineers enjoyed a series of works visits during their meeting at Malvern last week. On the Tuesday, members' itinerary included a tour of Nife Battery's works and Tube Investments' factories in the Birmingham area. At the former, some 200 guests saw a range of mining lamps and equipment in the course of production, and a typical self-service lamp-room installation specially built for the occasion. Emergency lighting equipment was also on show. Another party of some 75 engineers visited T.I.'s factories at Oldbury. They toured the works of Simplex Electric, Tube Products and Accles and Pollock, before returning to Malvern. The following day, Wednesday, a party of 80 was entertained by the Witton works of the G.E.C. Equipment seen in the course of construction included 70,000 kW alternators, 25,000 kW generating plant and 70,000 kVA transformers.

NEWS IN BRIEF

Hopes that the miners' homes at Rossington Colliery, Doncaster, would eventually obtain electricity supply have been raised following a meeting between a local deputation and Lord Citrine. As reported in our issues of June 14 and 21, the Yorkshire Board refused supply through lack of capital.

Among three certified money Bills passed by the Seanad last week was the Imposition of Duties (Confirmation of Order) No. 2 Bill, provided to cover a wider range of electrical water storage heaters now being made in Eire.

First Congress organised by the International Institute of Welding opens at Lancaster House on July 14. Technical meetings will be held in Oxford between July 16 and 20, and the concluding function will be a banquet at the Savoy Hotel, London, on July 21.

Under an Order issued by the Minister of Works, up until June 30, 1952, work may be done on property without a building licence if that work does not exceed £100, or in the case of industrial and agricultural buildings, £500.

Wholesale Fittings Co. Ltd.'s Manchester branch have made considerable extensions to their High Street offices. New feature is the extensive showrooms where all manner of domestic appliances are displayed—fluorescent and industrial fittings are on the first floor.

At a meeting of Shipley U.D.C last week, it was decided to defer for twelve months the scheme to provide refrigerators in Council houses, due to the increased purchase tax on those appliances.

The Royal Commission on Awards to Inventors has heard a claim by Dr. J. H. Mitchell for an award for the application of beam technique in radar, the application and development of Yagi type aerials to radar, and the application and development of spark gaps in pulse modulators.

An informal group taken during the visit of members of the Association of Mining, Electrical and Mechanical Engineers to the Nife works. They are (from left to right): F. W. Mann and C. N. Lees of Nife Batteries; F. J. Hopley, new president of the Association; F. W. Warner, Nife general manager; P. Crawford, Association's past-president; G. S. Atkinson and T. H. Clarke, both of Nife

Questions in Parliament

Colliery Electricians

Referring to men liable to recall as Z or equivalent reservists, Mr. Robens said under the present arrangements a colliery electrician might be recalled in an emergency, but only if he was urgently required for service in a capacity for which his previous experience in the Forces made him specially suitable.

Suppressors for Cars

The Postmaster-General was asked whether, pending their final report, he would invite his advisory committee to advise him as to the terms of a draft regulation to require suppressors to be fitted to motor cars for the reduction of interference on television sets? Mr. Ness Edwards replied that the committee was set up for the express purpose of advising on the requirements that might be prescribed in a regulation, and he must await their report on the point, which they were now drafting.

Ministry of Materials

Moving the second reading of the Ministry of Materials Bill, Mr. R. R. Stokes, after referring to consultations which had taken place with various manufacturers' organisations, said it was not the intention to set up another huge staff of people, but to transfer certain staff from the Board of Trade and the Ministry of Supply to the

new Ministry of Materials. As far as possible the changes contemplated would mean the least possible dislocation and inconvenience to industry. There were already under construction 18 new plants or conversions for the production of sulphuric acid by means of pyrites and the anhydrite process. The first plant should be operating in July. Responsibility for iron and steel, including matters of policy in the procurement of iron ore, scrap, and other steel-making raw materials, would remain with the Minister of Supply, but non-ferrous metals would be transferred. The important part of the work of the new Ministry will be the conservation of material and development of other resources and of alternative methods. According to statisticians, at the present rate of consumption, there is only 14 years proved supply of lead in the world and 21 years supply of zinc. After a lengthy debate, the Bill was given a Second Reading, by 296 to 277 votes, and the remaining stages were passed without a division.

Electric Supply News

Birkenhead

Initial tests have begun on the first of the 50 MW turbo-alternators at the new Bromborough power station, Merseyside and North Wales Division, B.E.A.

Braintree

A proposal that the signal posts of the local railway line, now destined to be closed to passenger traffic, should be utilised to carry the proposed 33 kV power line from Braintree to Dunmow, was made at the meeting of the Dunmow R.D.C. last week. For the second time members had before them a recommendation that no objection should be made to the Eastern Electricity Board's proposal to take the power line from Braintree to Dunmow through Felsted, Great and Little Dunmow. A member pointed out that the railway would continue to carry parcels traffic, and the power line would have to be erected at least 50 yards from the railway. After further discussion, the Council agreed not to raise any objection to the power scheme.

Eire

The Electricity Supply Board was operating at a loss of £80,000 a month, Mr. Lemass stated in the Dail last Thursday, when asked why it was proposed to increase tariffs. He said that the Board would use this year approximately 190,000 tons of American coal, which cost £8 a ton; 130,000 tons of British coal at £4 10s. a ton; 80,000 tons of turf at £2 6s. 5d. a ton, and a further 100,000 tons of turf at £4 10s. a ton.

Folkestone

Following an objection by Folkestone Town Council and by farmers against the original proposal of the South Eastern Electricity Board to erect o.h. lines at Hawkinge, an alternative scheme has now been prepared. The Elham R.D.C. considers the latter is satisfactory, and have agreed to support it.

Warminster

The possibility of some future Council houses, wired to be all-electric, but having to use oil stoves owing to shortage of copper wire, was mooted at the meeting of Warminster and Westbury Rural Council last week. The architect (Mr. G. Blair Imrie) had told the Housing Committee that the local executive officer of the Southern Electricity Board had informed him that their quota of copper wire was almost exhausted and that no further wiring could be done until April next year.

Woolwich

The Minister of Fuel and Power has given the B.E.A. his formal consent to the extension of Woolwich power station. The extension comprises one 30 MW turbo-alternator and two 180 klb/hr. boilers, which will bring the station's total installed capacity up to 133·25 MW.

LIGHTING SCHEMES

Ashby (Lincs). The lighting in the High Street is to be replaced by mercury discharge lamps.

Chesterfield. In the Hasland and Spital districts some 100 existing gas lamps are to be converted to electricity and additional standards and brackets provided.

Cowdenbeath.—The T.C. has approved proposals for improved street lighting in the town. Broad Street and Perth Road are to have sodium lighting, while the High Street is to be converted to fluorescent lighting. Total cost of the scheme is £4,456, including the new siting of certain poles and removing arms, wires, etc.

Esher.—The Highways and Planning Committee has recommended the preparation of an improving lighting scheme for the Portsmouth Road at Long Ditton and Thames Ditton.

Exeter.—After the Executive Council of the city's Chamber of Trade had decided to ask the City Council to improve street lighting, it was stated that the surveyor was in touch with manufacturers of fluorescent lighting fittings with a view to these being used later in the central area.

Grimsby. — The Housing Committee has approved schemes for providing street lighting at Carr Lane site at a cost of £837, and for Little Coates site at a cost of £713.

Newport (Mon.).—The Town Council has at last received M.o.T. approval to its plan to install electric street lighting.

Sowerby Bridge.—The U.D.C. is applying for loan consent for £3,300 to cover the cost of a new street lighting scheme, involving sixty 500 W tungsten lanterns and 59 concrete columns.

Worsborough.—The U.D.C. proposes to install electric lighting in a number of streets in Worsborough Bridge.

Company Activities

Ada (Halifax) Ltd.

Group profit for 1950 of this firm of machine tool and washing machine manufacturers—which became a public company in December last—is £217,280, and after charging taxation of £127,344 the net profit is £88,795. There is a final dividend of 5%, the year's total being at the rate of 25%.

Broadcast Relay Service Ltd.

Group trading profit is £1,341,126 (*£1,007,282*), and after deducting depreciation, directors' fees, etc., the consolidated net profit becomes £528,903 (*£460,640*), of which £181,394 (*£133,052*) is the share of minority interests, and £198,398 (*£191,466*) retained by subsidiaries, leaving £149,111 (*£136,122*) to Broadcast Relay Services Ltd. With £371,269 (*£356,700*) brought in there is £520,380 (*£492,822*) available, with a final Ordinary dividend of 8% tax free (*5%*).

Electric Construction Co.

Net profit for the year to March 31 last, is £97,369 (*£95,120*), after providing £124,708 (*£133,753*) for taxation. The Ordinary dividend is 15% (*same, including 2½% bonus*). To general reserve £20,000, plant replacement reserve £20,000 and superannuation reserve £20,000 (*all same*), and there is £52,252 carried forward.

Engineering & Lighting Equipment Co.

For the year to March 31, the net profit is £31,702 (*£17,222*). Dividends already announced take £13,348, to profits tax resulting from increased dividend £1,400 (*nil*), off development expenditure £1,243 (*nil*), leaving £24,852 (*£9,141*) carried forward.

Johnson Matthey & Co.

To provide additional capital for current requirements and further development it is proposed to make an issue of Ordinary shares by way of rights to existing holders and loan stock holders, subject to the consent of the C.I.C. For the year ended March 31 last, group net profit is £622,175 (*£897,366*), after providing £771,245 (*£745,677*) for taxation. The final Ordinary dividend is 12% (*9%*), making 15% (*12%*). Profit attributable to the holding company is £559,045 (*£853,481*).

Scottish Cables Ltd.

Abridged results for the year April 30, show a trading profit of £274,561 (*£273,901*). To taxation £143,700 (*£134,040*), depreciation and audit fee £24,656 (*£24,506*), leaving a balance of £106,205 (*£115,355*). With £21,730 (*£17,575*) brought in, there is £127,935 available. The final dividend is again 20% making 30%.

Ward and Goldstone Ltd.

Net profit after all charges, including taxation, for the year to March 31 last, is £200,631 (*£143,166*). Taxation provision includes transfer to reserve for future tax of £40,000 (*£30,000*). The final Ordinary dividend is 25% (*24%*), making 45% (*44%*), the interim last year being on the smaller capital.

Tube Investments Ltd.

The consideration payable to Stewarts and Lloyds Ltd., for the cancellation of the special rights attaching to the liaison shares held by Tube Investments Ltd. and Stewarts and Lloyds Ltd., has been agreed at £650,000. Shareholders will be notified shortly of the arrangements for carrying these terms into effect, which will result in the 500 liaison shares in T.I. being converted into 500 Ordinary shares as from February 14 last.

Dividends Declared

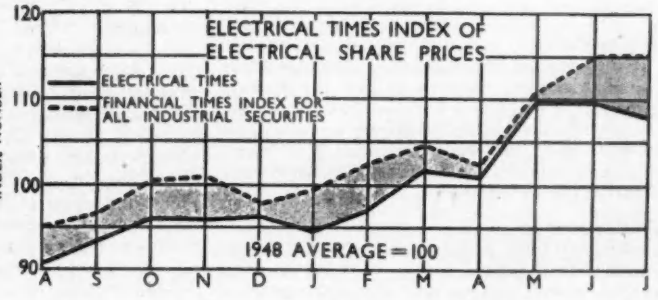
Aerialite Ltd. A second dividend of 55%, making 88½% to date, on the capital which was increased by share bonus of 87½%. Last year there was one interim of 62½% on smaller capital and a final of 50% on the larger capital.

Hick, Hargreaves and Co. Final Ordinary dividend of 13% on capital which has been increased by 20% bonus issue, making 15% (*10%*). Net profit is £140,050 (*£129,481*).

Hoover Ltd. Interim Ordinary dividend of 10% on capital increased by 100% scrip bonus (*15% on £935,000 Ordinary capital*). The increase is to reduce disparity between interim and final dividends.

Telegraph Construction and Maintenance Co. Interim of 5% (*same*).

During the past month the index for all industrial shares has eased its upward trend and remains reasonably steady. At the end of June the "Electrical Times" index was 108·5, having fallen from 109·6. The "Financial Times" figures for May and June showed a fall of 0·4, the latest being 115·5%. Figures are based on average prices ruling during 1948.



Commercial Information

CONTRACTS OPEN

HOME

July 6.—Tottenham. Supply and erection of about 205 lanterns, with 140W sodium lamps and concrete columns; 34 lanterns with 60W sodium lamps on existing columns; and 46 lanterns with 150W metal filament lamps on existing concrete columns. Applications by above date to Borough Engineer, Town Hall, N.15. Deposit £2.

July 7.—Coventry. Electrical wiring at Richard Lee Primary School. Director of Education, Council House. Deposit £1 1s.

July 7.—Dundee. Electrical work in ambulance depot at King's Cross Hospital for Eastern Regional Hospital. Applications by above date to Findlay, Stewart and Robbie, 33 Albert Square.

July 7.—Loughborough T.C. Supply of steel columns and supply and installation of 75 lanterns and 67 sets of auxiliary control gear for public lighting W. Granger, Borough Surveyor, Southfields. Deposit £1 1s.

July 7.—Reigate T.C. Supply and installation of two sludge ejectors, with electrically driven air compressors, starters, pipework and valves. G. G. Sanderson, Borough Engineer and Surveyor, Town Hall.

July 9.—Bingley U.D.C. Supply and erection of 28 street-lighting columns, lanterns and auxiliary equipment on Cottingley site. J. S. Lattin, Engineer and Surveyor, Town Hall. Deposit £2 2s. (See June 28 issue.)

July 9.—Farnborough U.D.C. Provision of street lighting along about 225 yd. of Sandhill, being part of street works. I. C. Jenkins, Council's Engineer and Surveyor, Town Hall. Deposit £3 3s.

July 9.—N. Ireland. Supply of electric bread slicer, floor polisher and food mixer for Coleraine and Portrush Hospital Management Committee. Secretary of Committee, Bann View Hospital, Coleraine.

July 9.—Preston T.C. Electrical services included in work on modernisation of laundry at Fulwood Civic Hostel. Richard R. Jennings, Consulting Engineer, 35 Byron St., Deansgate, Manchester 3.

July 9.—Ryton-on-Tyne U.D.C. Electric lighting and heating in 9 old people's houses on Runhead estate. Surveyor, Council Offices, Ryton Tower, Ryton.

July. 9.—Shrewsbury T.C. Installation of electric light and power in 36 houses being built at Harlescott. Borough Surveyor, Guildhall.

July 9.—Whitehaven T.C. One 10-ton diesel road roller with scarifier water sprayers, fluid fly-wheel drive and electric starting equipment. W. H. J. Browne, Town Clerk, Town Hall.

July 10.—Kendal T.C. Provision and installation of 92 mercury vapour lighting units, 25 fluorescent units, and supply and erection of concrete columns, fitting of lanterns with all auxiliary equipment and wiring. Borough Engineer and Surveyor, Municipal Offices, Lowther St. (See June 21 issue.)

July 11.—Dundee. Electrical work in two pavilions at Baldovan Instn. for Eastern Regional Hospital. Applications by above date to Maclaren, Soutar and Salmond, 15 South Tay St.

July 11.—Gt. Yarmouth T.C. Removal of existing installation and complete rewiring of Priory school. Schools Architects' Dept., 15 Regent Street.

July 12.—Truro. Complete installation of electricity in Regent Theatre. C. L. E. Stewart, Consulting Engineer, Court Rd., Newton Ferrers, Plymouth. Deposit £3 3s. (See June 21 issue.)

July 13.—Belfast. Supply and erection of automatic chlorinating plant at Harbour power station. Merz and McLellan, Consulting Engineer, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. (See June 7 issue.)

July 13.—Londonderry. Electrical installation at Coleraine Technical School. County Education Architect, Education Office, New Row, Coleraine.

July 13.—Malden and Coombe (Surrey) U.D.C. Supply and erection of 84 centrifugally spun concrete columns with 400 W mercury lanterns for Traps Lane and Coombe Lane. Borough Engineer, Municipal Offices, New Malden. (See June 28 issue.)

July 13.—Sutton and Cheam U.D.C. Erection of (a) 348 concrete columns, and (b) electrical equipment for 140 W sodium lamps, along seven miles of trunk roads A.217, A.232 and A.24. N. H. Michell, Borough Engineer and Surveyor, Municipal Offices, High St., Sutton, Surrey. Deposit £2 2s. for each contract.

July 13.—Torquay T.C. Supply and installation of diesel-driven automatic starting, electric generating plant to supply 4·5 kW at 230 V for Waterworks Dept. R. V. Toms, Water Engineer, Municipal Chambers.

July 14. — Macclesfield T.C. Supply and erection of 42 sodium lighting units on concrete columns for Hibel Rd., Gas Rd., Waters Green, and Sunderland St. T. H. Dossett, Borough Engineer, Town Hall. Deposit £2 2s. (See June 28 issue.)

July 16.—Durham. Provision of six and erection of 23 steel columns, mercury discharge lanterns and fittings, Group A, in Quarryheads Lane. City Engineer, Town Hall. Deposit £2 2s. (See June 21 issue.)

July 16.—Hastings T.C. Electrical installation in 32 dwellings at Hollington, and also 12 dwellings in Winchelsea Road. Applications to Borough Engineer, 37 Wellington Sq. Deposit £2 2s. for each scheme.

July 16.—Morley T.C. Electrical work in 96 houses on Asquith Ave. estate and 10 on Central estates. Housing Director, M. H. Brook, National Provincial Bank Chambers, Queen St.

July 16.—Preston T.C. Electrical installation for proposed new traffic offices. Borough Engineer and Surveyor, Municipal Buildings. Deposit £2 2s. (Advertised in this issue.)

July 16.—Swansea T.C. Electrical installation at Mayhill primary school. Applications by above date to Borough Architect, The Guildhall. Deposit £2. (See June 28 issue.)

July 17.—Rochdale T.C. Electric lighting and power installation at passenger transport dept. workshops, Mellor St. Borough Surveyor, Town Hall.

July 18.—Manchester. Electrical installation at City Training College, Long Millgate. City Architect, Town Hall. Deposit £1 1s. (See June 21 issue.)

July 19.—Halifax T.C. Re-electrification of the Ostler schools. Borough Engineer, Crossley St. Deposit £2 2s. (See June 28 issue.)

July 21.—Dunbarton. Provision, erection and wiring of 89 street-lighting columns on trunk road A.82. Includes 83 concrete columns, four ornamental cast iron columns and two wrought iron brackets, with sodium lanterns and time switches. Applicants should communicate by above date with William T. Samson, 124 Bridge St., Alexandria, Dunbartonshire. (Advertised in this issue.)

July 21.—N. Ireland. Supply and installation of underground cable system and electrical switchgear at Whiteabbey Hospital for N.I. Tuberculosis Authority. Applications to W. Harvey, Secretary, 27 Adelaide St., Belfast. Deposit £3 3s. in each case.

July 21.—Manchester. Electrical installation at evening school of domestic economy, Wilmslow Rd. City Architect, Town Hall. Deposit £1 1s. (Advertised in this issue.)

July 23.—Norwich. Supply of one small electrically driven compressor set. S. N. Kelly, Engineer and Manager, Water Dept., City Hall.

July 23.—Nottingham. Improved lighting scheme along 2,150 yd. of trunk road A.52 comprising concrete columns and 140 W sodium equipment. Lighting Engineer, 3 George St. Deposit £2 2s. (Advertised in this issue.)

July 24.—Epping U.D.C. Supply and erection of 46 concrete standards with sodium-type equipment for street lighting improvements. Council's Surveyor, H. J. Mead, 91 High St. (Advertised in this issue.)

July 30.—Newbiggin-by-the-Sea U.D.C. Provision and erection of 95 standards, lamps and auxiliary equipment on roads A.197, B.1334 and other streets in the district. H. Selby Robson, Engineer and Surveyor, Council Offices. Deposit £2 2s.

Aug. 2.—Swinton and Pendlebury T.C. Supply and erection of electrically driven centrifugal pump capable of 1,000 g.p.m. Borough Engineer and Surveyor, Town Hall, Swinton, Lancs.

Aug. 3.—Belfast. Supply and erection of a 6-ton travelling lifting, semi-Goliath, manually operated gantry for handling circulating water screens, for Electricity Dept. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (Advertised in this issue.)

Aug. 17.—Belfast. Supply and erection at Victoria power station of 3,300 V 150 MVA air or oil break switchgear, 400 V, 15 MVA air break switchgear, 400 V fuse gear and accessories. Also three centrifugal circulating water pumps each capable of 23,000 g.p.m. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. for each specification. (See June 14 issue.)

No date stated.—Dudley T.C. Installation of electric lighting and power points in 811 houses on Priory estate, 257 on Wolverton Rd. site, 86 in Northfield Rd. and 34 on Woodside estate. Applications to Borough Architect, Priory Hall.

No date stated.—Aberdeen. Supply and erection of approx. 13 miles of single circuit, wood pole line between Strichen and Peterhead, for N. of Scotland H.E. Board. Merz and McLellan, 39 Northumberland St., Edinburgh 3. Deposit £1 1s.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

July 18.—India. Supply of two steam friction winches for pile driving with double drums and complete with vertical boiler and all standard equipment. Director General of Industries and Supplies, Shahjahan Rd., New Delhi. B.o.T. (Ref. CRE(1B) 64332/51)*.

July — Uruguay. 20,708 incandescent lamps between 25 W and 1,500 W required by Central Railway of Uruguay; tenders by July 25. Also 1,910 fluorescent lamps between 15 W and 40 W and 18 in. and 48 in. in length for same; tenders by July 27. B.o.T. (Ref. CRE (IB) 64023/51).*

Aug. 1.—Melbourne. Total of eight 15 MVA transformers for State Electricity Commission of Victoria, 22-32 William St., Melbourne. B.o.T. (Ref. CRE (IB) 64611/51).*

Aug. 1.—Uruguay. Supply of 270 translators for aerial telephone lines of various specifications, required by Usinas Electricas y Telefonos del Estado B.o.T.(Ref.CRE(IB)63408/51)*.

Your Queries — Answered

"Schick" dry shavers, agents for? M.E. — Sydney H. Mugford Ltd., 11 Hills Place, W.1. (20629)

Foster mother for feeding piglets, makers of? A.W. —Arnold and Sons, 54 Wigmore Street, W.1. (20634)

"Canvary" water heaters, makers of? D.B.—Berry's Electric Ltd., Touchbutton House, Newman Street, London W.1. (20651)

"Spinney" hair dryers, makers of? E.B.—This is the registered trade mark of Littlewoods Mail Order Stores Ltd., Kershaw Ave., Crosby, Liverpool 23. (20660)

"Junction" irons, makers of? E.S.—G. P. Chamberlain and Co. Ltd., Junction Works, Carmichael Rd., South Norwood, S.E.25. (20669)

"Rotork" Bristol, address of? T.E.—Rotork Engineering Co. Ltd., 127 Bishops St., Bristol. (20675)

Reinhold Electrospray Mfg. Co., Switzerland, agents for? M.R.—The Baycock Engineering Co. Ltd., Victoria Works, Millhouse, Sheffield 8, were, but there is no trace of this firm at present. (20682)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

"Mauritex" insulating tape, makers of? M.B.

Aug. 2.—Uruguay. Supply of 400 metres of 3-phase underground l.t. 660V cable with copper conductor for the Ferrocarril Central del Uruguay, Calle La Paz No. 1095, Ciudad.

Aug. 14.—S. Africa. Electricity Dept., Cape Town, requires 1,000 street light galvanised fittings, 2,000 spare triple enamelled steel reflectors and 2,000 screw-cap porcelain lampholders. City Electrical Engineer, Electricity House, Strand St.

TRADE NOTES

B.E.A.M.A. Members. Newly elected members of B.E.A.M.A. are: Cooper and Turner Ltd. (arc welding electrode section), and New Day Electrical Accessories Ltd. (accessories section).

Change of Address. The new address of the S.W. Electricity Consultative Council is Pearl Assurance House, High St., Exeter. Tel.: Exeter 2291.

Change of Name. The title of Simmonds and Stokes Ltd., has now been changed to Simmonds and Stokes (Niphan) Ltd.

Holidays. The Warehouse and Despatch Dept. of the British Driver-Harris Co. Ltd., will be closed for the annual holidays from July 27 to August 14.

The offices and works of E. K. Cole Ltd., Southend, will be closed from Friday, July 27, until Wednesday, August 8.

British Insulated Callender's Cables Ltd. state that their various works will be closed for two weeks' holiday as follows: Prescot, Helsby, Huyton Quarry, and Melling Works, July 27 to August 11; Willenhall Foundry, July 28 to August 11; Erith, July 7 to July 21; and Anchor Works, Leigh, July 7 to 14 and September 8 to 15.

Moulding Powders. O. and M. Kleemann Ltd., the plastics concern, have just registered a new private subsidiary, Kleestron Ltd., which will manufacture a polystyrene moulding powder and other synthetic materials. Nominal capital is £100,000.

Registered Offices. The registered office of Lancashire Dynamo Holdings Ltd. is now 94 Petty France, London S.W.1. The registered office of Lancashire Dynamo and Crypto (Mfg.) Ltd., is also at that address, and this subsidiary is now entirely responsible for the activities of the Trafford Park and Willesden works.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	234 0 0	£220 0 0
LEAD, good soft pig (foreign)	160 0 0	136 0 0
" "English" quality	161 10 0	
TIN (99-99.75%) (Cash)	900-910	—
" (3 months)	840-842	—
ALUMINIUM, commercial purity (del.)	124 0 0	—
ZINC	160 0 0	140 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.)	47 10 0	—
Mild Steel Tape (0·04 in.)	26 10 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Krivert Ltd. Creditors should send particulars on or before July 31 to the liquidator, Leslie B. Blackler, Imperial House, Dominion St., E.C.2.

Ranelagh Radio and Electrical Co. Ltd. Resolution passed at meeting on June 20 and confirmed at meeting of creditors on same date, for voluntary winding-up with Mr. A. E. Attwood, of 20-21 Lawrence Lane, Cheapside, London E.C.2, as liquidator.

Sherborne Electrical Co. Ltd. Meeting of creditors to be held at Cozens Bate and Co., Carlton Chambers, 25 Baldwin St., Bristol 1, on July 18 at 3 p.m.

Strong Illuminating Engineering Co. Ltd. Creditors are asked to send particulars to Leslie B. Blackler, Imperial House, Dominion St., E.C.2, liquidator, by July 17.

Partnership Dissolved

Birmingham. Charles Macdonald Durant, Lorna Edwards and Hodgson Lorance, electrical wholesalers trading as "Durant and Lorance" at 15 Frederick St., Birmingham. Partnership dissolved as from Oct. 31, 1950. All debts will be paid by C. M. Durant and L. Edwards, who will continue the business.

Winding-up Orders

London. Electric Toys Ltd., Maddox St., W.1. Date of order, June 25.

London. Gordon Refrigeration Co. Ltd., Westbourne Grove, W.11. Order dated June 25.

London. Ribec Battery Co. Ltd., Magdalene St., Glastonbury, Somerset. Date of order was June 25.

Dividend

London. Harrison and Co. (Electrical) Ltd., wireless and electrical factors, of 6 Broad St. Place, E.C.2. First and final dividend of 2s. in £ payable at offices of A. E. Attwood, liquidator, 20-21 Lawrence Lane, Cheapside, E.C.2, on July 11.

BANKRUPTCY ACTS

First Meeting

Kendal. Stephen Edmundson, electrical dealer and contractor, trading as "E. and B. Radio" at Maine St., Milnthorpe. First meeting at 31 Stramongate, Kendal, on July 10 at 12.30 p.m., and public examination at County Court Offices, 48 Stramongate, on July 23 at 11.30 a.m.

Receiving Order

Croydon. Douglas Cromwell and Mrs. Valerie I. Cromwell, electrical fittings and lampshade manufacturers trading as Cromwell and Co., at Hindsley Works, Hindsley Place, Forest Hill, S.E.23. Date of receiving order, June 22.

Release of Trustee

Preston. Frank Clarkson, electrician trading as W. Ratcliffe and Sons at 78 Pall Mall, Chorley. Trustee was Lawrence H. B. Worsley, C.A., 14 Acresfield, Bolton.

CONTRACTS PLACED

Birmingham. Conversion from d.c. to a.c. of electricity supply and provision of additional power plugs on separate circuits at Dudley Rd. infirmary, Midlands Electricity Board, £3,150.

Bradford. Installation of electricity at Claytons infants' school, Southern and Redfern Ltd., £2,121.

Hebburn-on-Tyne U.D.C. Provision of street lighting on Campbell Park No. 2 and Mill Lane schemes, N.E. Electricity Board, £1,799

Washington (Durham) U.D.C. Electrical installation in 50 houses in Blue House Lane, Den Lea Electricals, £1,113.

Warrington T.C. Re-wiring of electrical installation at public baths, W.E. Kidd, £1,317.

BUSINESS PROSPECTS

HOME

Alloa. Dean of Guild Court has approved factory extensions in Bowhouse Rd. for Scottish Tiles Ltd. Estimated cost is £3,500.

Antrim R.D.C. Erection of 24 bungalows at Ballyrobert. McCarthy and Lilburn, quantity surveyors, 47 Scottish Provident Buildings, Belfast.

Belford (Northumberland). A new modern school is to be built at Seahouses.

Blyth T.C. Application made for sanction to build 53 houses on Cowper Rd. estate at estimated cost of £75,636.

Bolton T.C. Erection of 152 houses and flats in three lots on Johnson Fold estate. Housing Director, Town Hall.

Cookstown (Tyrone) U.D.C. Erection of a town hall. W. and M. Given, architects and civil engineers, 1 Waterside, Coleraine.

Cork. A factory is to be built by O'Brien Bros. (Flax) Ltd., in Kinsale Road. It is proposed to build 110 houses at Mount Pleasant and 280 at Gurranebraher.

Crawley (Sussex). Development Corporation invite applications from contractors desiring consideration in erection of 110 dwellings on Northgate site and 490 on stage one at Three Bridges. Chief Architect to Corporation, Crawley.

Darlington. A new bus station is to be built at a cost of £18,000.

Egham (Surrey) U.D.C. Erection of 52 houses in Thorpe Rd. Engineer and Surveyor, Fire Station Buildings, High Street.

Eston U.D.C. Erection of 75 houses on Granville Rd. estate. Council's surveyor is N. C. Harrison.

Forfar T.C. Revised scheme approved for building of 98 houses in Queen St. and 8 in South Street.

Glendale R.D.C. Scheme approved for construction of 64 houses at Wooler. T. J. Cahill, council's architect, Lloyds Bank Chambers, Alnwick. Plans are being laid for new council offices.

Hay-on-Wye R.D.C. Construction of 48 houses on five sites. Surveyor's Office, Council Offices, Hay, Hereford.

Heywood T.C. Plans approved for extension to factory of Park Towels Ltd.

Hull T.C. Approval granted for rebuilding of Dawber Townsley and Co. Ltd., premises in Park Road.

Hythe T.C. Scheme approved for demolition and restoration of the pavilion at Marine Parade at estimated cost of £11,000.

Kidsgrove (Staffs) U.D.C. Erection of 134 houses on Lower Ash and Hollins Farm estate in seven contracts. J. Lewis Bleazard, Engineer, Architect and Surveyor, Town Hall.

Londonderry. Co. E.C. approved erection of Clondermott intermediate school at Waterside. A. T. Marshall, architect, Lanes Princes Quay.

Middlesbrough. Contracts to be let shortly for installation of electric light and power at Lawson secondary modern and St. John's schools. Also Cairns and Byles of 21 Ellison Place, Newcastle, have been appointed consultants for proposed heating and lighting at Green Lane school. Also Turner and Ing, 71 Linthorpe Rd., are quantity surveyors for proposed Green Lane county primary school.

Newcastle-on-Tyne. Next year's school building programme to include Stocksfield Ave. primary, Rutherford High, secondary at Fossway and Technical school in West End. City Architect is G. Kenyon, 18 Cloth Market.

Newcastle-under-Lyme T.C. It is proposed to build 100 houses in Windermere Road.

Norwich. G. T. Redgment, consulting engineer, 76 Prince of Wales Rd., has been appointed by E. Anglian Regional Hospital Board, for electrical work at 10 Brunswick Rd., accommodation for domestic staff at Norfolk Hospital.

Poplar. It is proposed to build 104 flats and maisonettes in two blocks in the Abbott Road area.

Portadown. Approval has been given for erection of a hospital for N. Ireland Hospitals Authority, 58 Howard St., Belfast.

Redhill (Surrey). Large extensions are to be carried out by the Monotype Corporation of Salford, at estimated cost of £120,000.

Rugby R.D.C. Construction of 17 houses at Stretton-on-Dunsmore and 16 at Wolvey. Council's Surveyor, 24 Warwick St.

Saddleworth U.D.C. Erection of 50 houses at Greenfield. Howard and Benson, chartered architects, 88 Mosley St., Manchester 2.

Sowerby Bridge U.D.C. Construction of 24 houses on Kershaw House site. J. Normanton, Architect to Council, "Beech Royd," Beech Road.

Stirling T.C. It has been proposed that 42 houses be built at Drum Park, 41 at Broomridge, 38 at Cornton, 26 at Coxithill and 16 at Raploch.

OVERSEAS

Canada. Pembina Electric Refrigeration, 325 Pembina Highway, Winnipeg, wish to contact suppliers of sealed refrigerator units for installation in domestic refrigerators with a view to obtaining the exclusive representation in W. Canada for any unit found suitable. They would operate on 110-115 V a.c.

A Canadian firm wants to contact U.K. manufacturers of medium-sized industrial boilers with a view to representation throughout the country. The name of the company is not given, but interested parties are asked to contact the B.o.T.'s Commercial Relations and Exports Department, quoting reference CRE(1B)63510/51.

Also Mr. Fearn, of Basil Fearn Ltd., Beck's Cove, St. John's, Newfoundland, would like to obtain additional agencies for U.K. manufacturers of d.c. generators, d.c. motors, commercial electrical fittings, principally for marine use, and storage batteries.

British E. Africa. Mr. J. Riley of Naumann Gepp (E. Africa) Ltd., is at present visiting the U.K. to obtain agencies for hand tools, domestic refrigerators and electric stoves. Enquiries should be addressed to the firm's London branch at 154 Fenchurch St., E.C.2.

Burma. Trade literature and quotations for small diesel-electric generators with electric furnaces for reducing scrap and production of household and building metal products, are sought by Mr. S. V. Arneson, S.T.E.M., American Embassy, Rangoon.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Alabar. 698,024. Class 11. Diffuser shades for fluorescent lighting. Scemco Ltd., 6 Soho St., W.1.

Guardion. B697,570. Class 9. Electrical instruments and apparatus. F. A. Hughes and Co. Ltd., Bath House, 82 Piccadilly, W.1.

Launderlog. 688,999. Class 9. Combined thermometers and liquid level gauges. Foxboro-Yoxall Ltd., Lombard Rd., Merton, S.W.19.

Lockplast. 697,564. Class 20. Panels of plastics (not fitted) for use in mounting instruments. New Western, 136 Meadow Lane, Leeds 11.

Norlite. 697,782. Class 11. Lampshades. Northern Lights Studio, 68 Chapel St., Marlow, Bucks.

Panda. 696,845. Class 9. Radio and television apparatus. Panda Radio Co., 58 School Lane, Rochdale, Lancs.

Porvic. 695,653. Class 11. Moulded and shaped elements made of plastics being parts of filters. Pritchett and Gold and E.P.S. Co., Ltd., Dagenham Dock, Essex.

Ronning. B 695,666. Class 11. Electrical drying devices for insertion in boots and shoes. Ronning and Co., 7 York Place, Adelphi, W.C.2.

Spotmaster. B695,941. Class 11. Electric torches, vehicle reflectors and anti-dazzle devices. Notek Electric Co. Ltd., 23 London Rd., Bromley Kent.

Staticon. B697,614. Class 7. Electricity alternators, generators and dynamos. Brush Electrical Eng. Co. Ltd., Falcon Works, Nottingham Road, Loughborough.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

R. J. Bates (Bury St. Edmunds) Ltd., 20 Butter Market, Bury St. Edmunds. To take over business of a radio relay and electrical engineer carried on at Bury St. Edmunds by Ronald J. Bates, Cap.: £5,000. Dirs.: R. J. Bates. Ethel Bates and A. H. Moore.

Domestic Devices Ltd., 44 Gt. Russell St., W.C.1. Manufacturers of and dealers in vacuum cleaners, floor polishers and cleaning and sweeping tools, etc. Cap.: £100. Dir.: C. B. Umney.

Edward Lee and Son (Leicester) Ltd., 55 Nichols St., Leicester. General precision, mechanical, motor and electrical engineers, etc. Cap.: £2,000. Dirs.: J. E. Lee and T. H. Coaton.

Harry George (Surbiton) Ltd., 39 Victoria Rd., Surbiton, Surrey. Electricians, mechanical engineers, etc. Cap.: £2,000. Dirs.: H. G. Lewin and P. J. Linford.

I. V. Llewelyn (Porth) Ltd., Post Office Bldgs., Porth, Glam. To take over business of electrical contractors carried on as "I V. Llewelyn Electrical and Refrigeration Engineer" at 44 Dunraven St., Tonypandy, and Post Office Bldgs., The Square, Porth, Glam. Cap.: £2,500. Permt. dirs.: I. V. Llewelyn and Mrs. B. Llewelyn and W. V. Meacock.

A. Lowrey Ayre and Co., Ltd., 91 Chester Rd., New Oscott, Sutton Coldfield. To take over business carried on at Sutton Coldfield, as "Radex," by Amos Lowrey Ayre, manufacturers of and dealers in electrical goods, television and wireless sets, etc. Cap.: £4,000. Dirs.: A. Lowrey Ayre and Mrs. G. A. Ayre.

Magnetic Equipment Co., Ltd., 78 Highbury Grove, Cosham, Hants. To take over business of engineers carried on as "The Magnetic Equipment Co." at Cosham, Hants. Cap.: £7,500. Dirs.: H. E. Hutter and Mrs. K. Hutter, S. C. Johnson and Mrs. M. Johnson.

Manifold Electric Co., Ltd., Town Hall Chambers, Uckfield, Sussex. Electrical engineers, etc. Cap.: £1,000. Dir.: A. C. Howeson.

Vorwerk Trading Co., Ltd., Buyers, sellers, assemblers, importers and exporters of vacuum cleaners, refrigerators, universal electrical and other household appliances, etc. Cap.: £5,000. Dir.: A. E. Jennings, address not stated. Subs.: R. A. Rogers, 2 Plum Lane, S.E.18, and R. F. B. Marshall, 3d The Park, London Rd., Forest Hill, S.E.23.

MEETINGS TO NOTE

THURSDAY, JULY 5

FESTIVAL SHIP "CAMPANIA" arrives at Plymouth, remaining until July 14.

THURSDAY, JULY 12

INCORP. PLANT ENGRS. (Newcastle Branch).—"Oil in Industry." I. A. Howden of Shell-Mex and B.P. Ltd., 8 Oxford St., 7.30 p.m.

FRIDAY, JULY 13

E.I.B.A.—Annual meeting and council at I.E.E., Savoy Place, W.C.2, 11.30 a.m.

MONDAY, JULY 16

INTERNATIONAL CONFERENCE ON AUTOMATIC CONTROL IN INDUSTRY. Opens at Aeronautical College at Cranwell. Ends on July 21.

WEDNESDAY, JULY 18

FESTIVAL SHIP "CAMPANIA" will be open to public at Bristol between this date and July 28.

W. T. HENLEY'S TELEGRAPH WORKS

The Second Best Year

THE annual general meeting of W. T. Henley's Telegraph Works Co. Ltd., was held on June 29 in London, Sir Montague Hughman, the chairman presiding.

The chairman, in the course of his speech, said: My mind goes back to 27 years ago, when I became a director of this company. Throughout the whole period during which I have been your executive chairman, the organisation has shown, year by year, progress and development, culminating in 1949 in a very high record of output from our factories, and which, after 112 years, is something to be proud of. For the 113th year, which is 1950, we have not reached the high figures of 1949, but I think you can look upon the accounts before you as being the second best in the company's history, and all our subsidiaries paid dividends out of satisfactory profits earned in 1950.

We were faced throughout the year with many difficulties; it was a period of steeply rising production costs and frequent price adjustments,

and competition during the first half of the year was extremely keen in every department of our business at home and overseas. With the outbreak of war in Korea last June, business showed a rapid change from a buyers' to a sellers' market in a few days. Prices of practically all materials began to rise—delivery times were lengthened—and by the end of the year there was a shortage of practically all materials we require. These conditions have tended to become more acute during the current year. The changes in the Budget by the Chancellor of the Exchequer recently have made the burden of taxation still more onerous. The increase in the distributed profits tax from 30 per cent. to 50 per cent., together with the unchanged 10 per cent. tax on undistributed profits is a great hardship to industry. Profits tax is not deducted from dividends, and as we have not changed our rate of dividend for many years, the whole burden of this increase falls upon our reserves, which are undistributed profits. In addition, the withdrawal of the initial allowance for depreciation, which was 40 per cent. in 1949, will be another severe blow to industry.

Works Production

Woolwich and Birtley Rubber Cable Works: The combined output was 5% higher than the previous year. The demand for rubber cables during the first half of 1950 was on a much reduced scale, but as the year progressed the position changed completely. The autumn demands were so heavy in some of the "bread and butter" types that in a number of cases we were unable to execute orders as promptly as we should have liked. Our productive capacity was supplemented during the year by the output of our fine new factory at Birtley.

Gravesend Paper Cable Works: The opening months of the year found us well clear of the end of the post-war rush of business, and this fact, together with the unsettled conditions brought about by the financial crisis and the cut in Government expenditure, created an appreciable reduction in the demand for power cables. During the second half of the year, however, there was a considerable improvement.

The demand for Henley tyres, both at home and overseas, has never been greater, but the year has been an extremely difficult one. Notwithstanding the difficulties, the result of the year's work shows a very satisfactory profit.

The balance of our trading account for the year 1950 is £1,486,283. Our overseas business, taken as a whole, is not quite so good as in 1949, representing a little under 40 per cent. of our total turnover. The results are nevertheless satisfactory.

The dividend for the year is a very modest return, as it represents, after deduction of income tax, a little over 2% on the capital employed. It is hoped that the present inflationary tendency may be halted soon, so that we can look forward to a period of more reasonable and regular prices of our main raw materials. This would help our business and enable us to judge more nearly our financial requirements of the future.

The report was adopted and a final dividend of 10%, making 15% for the year, and a cash bonus of 5%, were approved.

LONDON ELECTRIC WIRE AND SMITHS

Raw Material Shortages

THE forty-second annual general meeting of the London Electric Wire Company and Smiths, Limited, was held on June 27, in London.

Mr. W. J. Terry (chairman and managing director), in the course of his speech said: At the annual meeting last year I was able to report a better supply of raw materials during 1950. The position, however, has now been reversed and there are not any raw materials in which your company is interested which are not in short supply—some desperately so. All supplies of virgin copper, our principal commodity, must be obtained through the Ministry of Supply and since February 1, 1951, supplies have been rationed to 85% of consumption during the first six months of 1950, which happened to be a generally slack period, being prior to the announcement of the newly introduced Defence Programme.

The effective supplies available to your company are, in fact, less than 85% because other supplies in the form of rods are not now obtainable from home sources and we are therefore, most unfortunately, only able now to provide our customers with considerably less than 85% of their purchases during the period selected by the Ministry. The shortage of raw materials generally, not only of non-ferrous metals, is causing great embarrassment.

Excessive Taxation

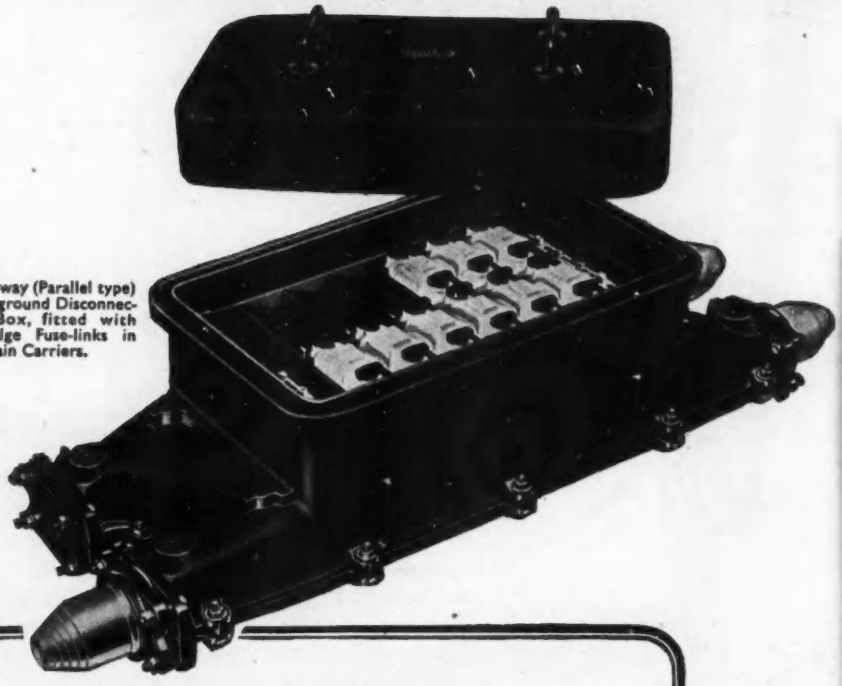
Some remission in taxation—and there seems to be no early prospect of any remission although so urgent and necessary—is essential for the well-being of industry and this can be brought about only by a substantial reduction in Government expenditure. In my opinion the existing excessive taxation is the prime cause of the inflation which exists today, or in other words, the root of our troubles. Private enterprise is constantly using its skill and experience to keep down costs in order to maintain our position in world markets but is continually burdened by increases in taxation to meet extravagant Government expenditure. The Government appears to be interested only in raising taxation and completely blind to the harmful effect that such taxation may have on the productive effort of the community.

With the reduced supplies as at present envisaged, it will not be possible to maintain last year's rate of output. It is most disappointing to our customers who have planned for increased production for essential services and desirable overseas markets to be faced with restricted supplies due entirely to a lack of raw materials. These supplies to our regular customers are further jeopardised by the increasing demands of Government departments for priority to be given to Defence Orders. In respect of non-ferrous metals, it would be well worth while to take immediate steps to reconstitute the London Metal Exchange which for so many years established the world prices for metals.

The capital employed in this company amounts to £3,974,718 and on this capital the total dividends paid represent 2·95% gross or 1·59% after deduction of income tax, which cannot be considered to be an extravagant distribution.

The report was adopted.

UNDERGROUND DISCONNECTING BOXES



Three-way (Parallel type) Underground Disconnecting Box, fitted with Cartridge Fuse-links in Porcelain Carriers.

The range of HENLEY Underground Disconnecting Boxes meet all normal requirements for isolating or interconnecting in low tension distribution networks. All boxes incorporate special HENLEY features, such as diving bell lids, porcelain insulation designed to prevent creepage across the face of compound, etc.; supplied with or without C.I. Pits and Pavement Frames and Covers. Fitted with Cartridge Fuse-links or Wedge Type links, as required.
Please ask for Catalogue 27.

HENLEY

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.
51-53 HATTON GARDEN, LONDON, E.C.1

WESTON
Electrical Measuring Instruments

No. 2 **Sub-standard Instruments**

The Weston Series of Portable sub-standard instruments covers a wide range of applications, including precision measurements in the laboratory . . . meter standardisation . . . transfer standards between D C and A C circuits . . . field measurements, acceptance tests, etc. They are available as Wattmeters, Voltmeters, Ammeters and Milliammeters in a variety of ranges and all embody 6" scales, magnetic shielding and spring-loaded jewels. Full details of these instruments, also Weston switchboard, panel, first grade and laboratory standard instruments will gladly be supplied on request.

SANGAMO WESTON LIMITED

Enfield, Middlesex. Tel: Enfield 3434 (6 lines) & 1242 (4 lines). Grams: Sanwest, Enfield

Branches: Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton & Brighton

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., London, W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. 0d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

COUNTY COUNCIL OF DUMBARTON

STREET LIGHTING: TRUNK ROAD A.82
INSTALLATION OF ELECTRIC STREET LAMPS

TENDERS are invited for the provision, erection and wiring (complete) of 89 street-lighting columns on the above-mentioned road within Vale of Leven and Renton special lighting district of the county of Dumbarton. The contract includes for the supply, delivery, erection (complete) of 83 concrete columns with 2 ft. 6 in. outreach brackets, 25 ft. mounting height, and for the raising in height of 4 ornamental cast-iron columns on Bo. hi 1 Bridge and 2 wrought-iron brackets; also for the supply, delivery, wiring and fixing of 89 sodium lanterns with time switches, etc., and putting installation into operation.

Contractors who desire to offer for this work are requested to communicate with the County Sanitary Inspector (Mr. William T. Samson, 124 Bridge Street, Alexandria, Dumbartonshire), not later than July 21, 1951, in order that their names may be placed on the list of contractors to whom schedules may be issued.

The County Council reserve the right to make selections from the list of applications and do not bind themselves to accept the lowest or any tender.

ARCHD. A. TEMPLETON,
County Clerk.

County Buildings, Dumbarton.
June 28, 1951. (L 319)

CITY OF MANCHESTER

THE Education Committee invite tenders for ELECTRICAL INSTALLATION at the Evening School of Domestic Economy, "Birchfield," Wilmslow Road, Manchester, 14.

Specification and drawings may be obtained at the office of the City Architect, Town Hall, upon payment of £1 1s. which sum will be returned upon receipt of bona-fide tender. All cheques and postal orders are to be made payable to the order of The Corporation of Manchester, and crossed.

Sealed tenders, enclosed in the official envelope, to be delivered at the Education Offices, Deansgate, Manchester 3, not later than Saturday, July 21, 1951.

The Corporation do not bind themselves to accept the lowest or any tender.

PHILIP B. DINGLE,
Town Clerk.

Town Hall, Manchester.
June, 1951. (L 280)

CITY OF BELFAST

Electricity Department

LIFTING GANTRY, VICTORIA POWER STATION

TENDERS are invited for the supply, delivery, and erection of one 6-ton travelling lifting semi-Goliath manually operated gantry, for handling circulating water screens over a span of 32 ft.

Form of tender (No. N.1057), conditions and specification, in quadruplicate, may be obtained from Messrs. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-upon-Tyne, 1, on payment of a deposit of 5 gns. (cheques to be made payable to the Belfast Corporation Electricity Department), which deposit will be refunded provided a bona fide tender be lodged and not withdrawn. Extra copies of the contract documents may be obtained at 3 gns. each, which sum will not be returnable.

Each tender, in quadruplicate, in sealed envelope marked "Tender for Lifting Gantry, Electricity Committee," and endorsed with the name and address of the

(*Continued in next column*)

(*Continued from previous column*)

tenderer, must reach the undersigned not later than 4 p.m. on Friday, August 3, 1951.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
June 29, 1951. (L 321)

EPPING URBAN DISTRICT COUNCIL

STREET LIGHTING IMPROVEMENT SCHEME

TENDERS are invited for the supply and erection of 46 25 ft Concrete Standards fitted with sodium discharge-type lighting equipment.

Specification and bill of quantities can be obtained from the Council's Surveyor, H. J. Mead, F.I.A.S., M.R.S.I., 91 High Street, Epping, to whom all inquiries should be addressed.

Tenders in plain envelopes bearing no indication of the sender and endorsed "Street Lighting," must be returned to the undersigned not later than 12 noon on Tuesday, July 24, 1951.

The Council do not bind themselves to accept the lowest or any tender.

B. HISCOTT,
Clerk of the Council.

Council Offices,
Hawthorn Lodge,
91 High Street,
Epping, Essex.
28th June, 1951. (L 309)

COUNTY BOROUGH OF SWANSEA

Mayhill Primary School, Mayhill, Swansea

TENDERS FOR ELECTRICAL INSTALLATION

FIRMS wishing to tender for the Electrical Installation at the Mayhill Primary School now in course of erection at Mayhill, Swansea, are invited to submit their applications to the Borough Architect, The Guildhall, Swansea, on or before Monday, July 16, 1951.

Plans, specifications and conditions of contract can be obtained on application and deposit of £2, provided the applicant gives satisfactory evidence of having previously carried out work of a similar character. The deposit will be refunded after delivery of a bona fide tender (which is not subsequently withdrawn) and the return of all documents.

No guarantee is given that the lowest or any other tender will be accepted.

T. B. BOWEN,
Town Clerk.
(L 268)

CITY OF NOTTINGHAM

TRUNK ROAD NO. A52
IMPROVED LIGHTING SCHEME

TENDERS are invited for the whole or part of the following works in connection with the provision of improved lighting of Group A standard on a section of trunk road No. A52, 2,150 yards in length, within the City of Nottingham:—

(A) Provision of concrete lighting columns.
(B) Provision of 140-watt sodium lighting equipment.

General conditions of contract and plans may be seen and specifications and bills of quantities obtained from the Lighting Engineer at his office at 3 George Street, Nottingham, on payment of a deposit of 2 gns., which will be refunded on receipt of a bona fide tender.

Tenders in plain, sealed envelopes, endorsed "Lighting Scheme—Trunk Road," must be delivered to the undersigned not later than 12 noon on Monday, July 23, 1951.

T. J. OWEN,
Town Clerk.

The Guildhall, Nottingham. (L 320)

COUNTY BOROUGH OF PRESTON

Engineer and Surveyor's Department

WATCH COMMITTEE

TENDERS are invited for the ELECTRICAL INSTALLATION for the proposed New Traffic Offices, Part Phase 2, Early Street, Central Police Station, Preston.

Forms of tenders, drawing, specification, conditions and schedule of work may be obtained at the office of the Borough Engineer and Surveyor on payment of a deposit of £2 2s. which will be refunded on receipt of a bona-fide tender.

Tenders on the prescribed form must be delivered to the office of the undersigned in the envelope provided bearing no indication of the name of the sender not later than 9 a.m. on Monday, July 16, 1951. The Corporation do not bind themselves to accept the lowest or any tender.

W. E. E. LOCKLEY,
Town Clerk.

Municipal Building, Preston (L 301)

APPOINTMENTS VACANT

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:

ASSISTANT ENGINEER (Mains Maintenance)

Portsmouth District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B., Class "F," Grade 11, Column 1 (£482 per annum). N.J.B. conditions of service.

Candidates should have had experience in the design, construction, operation and maintenance of h.v. and l.v. overhead and underground distribution systems and possess suitable technical qualifications. The successful candidate will be required to assist the maintenance and operation engineer principally in connection with the maintenance of high and low voltage mains.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him not later than July 16, 1951.

SENIOR DRAUGHTSMAN

Sub-Area Engineer's Department, Bournemouth. Provisional salary £500 per annum, subject to adjustment. Conditions of service as prescribed by the board from time to time.

Candidates should have had training and experience in the design and construction of buildings and civil engineering works of an industrial type generally, and in addition, although this is not essential, some experience in the construction of electricity showrooms and offices. Experience in taking off quantities, preparing bills of quantities and of checking building and civil engineering contractors' accounts is essential.

Applications on forms obtainable from the Sub-Area Secretary, 1 Priory Road, Bournemouth, and returned to him not later than July 16, 1951.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

F. W. KEMPTON,
Secretary.

July 5, 1951. (L 330)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointments:

(a) STATION SHIFT CONTROL ENGINEER, Letchworth Generating Station.

(b) STATION SHIFT CONTROL ENGINEER, Watford Generating Station.

Salaries in accordance with the National Joint Board Agreement, Schedule A, Grade 10, Class "E" (£488-£502 per annum). In addition, London Weighting will apply to the Watford appointment.

Applicants should have reached the standard of Ordinary National Certificate in electrical engineering or its equivalent, have experience in the operation of a switchboard at a generating station and be fully conversant with high tension switching operations and protective systems. In addition, for (a) a knowledge of the operation of various types of D.C. converting plant will be an advantage.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than July 13, 1951. Envelopes should be endorsed with the appointment sought.

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (L 285)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 3 (Sheffield) Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER
(Sheffield South) (Vacancy No.84/51)

Applicants must have technical qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers, with training and experience fitting them to take charge of sub-station and mains construction, operation and maintenance work in a heavy industrial and densely developed residential area surrounded by a rural area in which are 33 kV and l.v. underground and overhead systems of electricity mains. The successful candidate will be expected to take personal charge of the more responsible construction and maintenance work on the 11 kV and l.v. systems in the district.

Salary, N.J.B. agreement, Class "G," Grade 7, £651 to £679 per annum.

GENERAL ASSISTANT DISTRICT ENGINEER
(Sheffield North) (Vacancy No. 82/51)

Applicants should hold at least the Higher National Certificate in electrical engineering and should have had construction experience on overhead and underground distribution systems up to 11 kV. Experience on operation under fault conditions will be an advantage.

Salary, N.J.B. agreement, Class "K," Grade 11, £607 to £631 per annum.

Applications, stating the above vacancy numbers, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, within fourteen days of the appearance of this advertisement.

No. 5 (Wakefield) Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER (Barnsley)
(Vacancy No. 80/51)

Applicants must have had a sound practical training and considerable experience in the construction, operation and maintenance of h.v. and l.v. overhead and underground distribution networks, sub-station plant and ancillary equipment. Preference will be given to applicants who are Corporate Members of the Institution of Electrical Engineers, or who hold equivalent qualifications.

Salary, N.J.B. agreement, Class "F," Grade 7, £625 to £643 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, within fourteen days of the appearance of this advertisement. (L 327)

SOUTH EASTERN ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEER
Brighton and Hove District

SALARY of £565 to £593 p.a. under the N.J.B. Schedule Class "F," Grade 8. (It is probable that the classification may become "G" in the near future.) Superannuation will be arranged. Candidates, who must hold, as a minimum technical qualification, the Higher National Certificate in Electrical Engineering, should have had training in distribution engineering followed by experience in the construction, operation and maintenance of underground and overhead systems up to 33 kV, including d.c. Duties involve standby.

Applications must reach the Brighton and Hove manager, SEEBoard, Electric House, Castle Square, Brighton, 1, by July 16, 1951.

GENERAL ASSISTANT ENGINEER (Construction)
Kent Sub-Area Headquarters

Salary of £486 p.a., rising to £506 p.a. under the N.J.B. Schedule, Class "J," Grade 13. Superannuation will be arranged. Applicants must have had experience in the construction of 33 kV, 11 kV and l.v. overhead lines, substations, survey, etc., and should possess Higher National Certificate or equivalent qualification. Duties involve standby.

Applications, giving two referees, must reach H. F. Knell, J.P., M.I.E.E., Kent Manager, SEEBoard, 178 High Street, Rochester, Kent, by July 16, 1951.

ASSISTANT ENGINEER
Folkestone District

Salary of £524 to £542 p.a. under N.J.B. Schedule, Class "D," Grade 8. Superannuation will be arranged. Applicants must have experience of distribution work, including the construction, maintenance and operation of h.v. and l.v. cables, a.c. and d.c. switchgear, transformers, overhead lines, sub-stations, protective gear, etc., and must possess Higher National Certificate or equivalent qualification. Duties involve standby.

Applications, giving two referees, must reach P. V. Gurr, J.P., Folkestone Manager, SEEBoard, York House, Cheriton Gardens, Folkestone, by July 16, 1951.

A. L. BURNELL,
Secretary.

June 29, 1951. (L 329)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

Norfolk Sub-area

Sub-Area Headquarters, Norwich 14/51 R

COMMERCIAL ASSISTANT

Applicants should be of good address and must be fully experienced in the projection of sound films and have the ability to organise and operate a mobile film exhibition unit. Experience in the application and utilisation of electricity to domestic, commercial and industrial purposes and the ability to lecture to Schools, Trade Associations and Women's Organisations would be an advantage. Ability to drive a car is essential.

The salary for the appointment will be in accordance with Grade 1 (£310 by £20 to £390) of the National Joint Council Salary Agreement dated March 23, 1950.

Applications, stating age, education, qualifications and experience with details of present appointment and salary, should be submitted to The Manager, Norfolk Sub-Area, Eastern Electricity Board, Duke Street, Norwich, within 14 days of the appearance of this advertisement.

King's Lynn and Western District 72/51 R

DEMONSTRATOR

Candidates should have had Domestic Science training, including electrical housecraft, and should preferably hold the E.A.W. certificate. They should be competent to plan and give cookery demonstrations, including lectures and advice to consumers on the utilisation of domestic electrical appliances. Previous experience in an Electricity Service Centre is desirable.

The salary for the appointment will be in accordance with Grade 1 (£310 by £20 to £390) of the National Joint Council Salary Agreement dated March 23, 1950.

Applications, stating age, education, qualifications and experience, with details of present appointment and salary should be submitted to The Manager, King's Lynn and Western District, Eastern Electricity Board, Gaywood Bridge, Wooton Road, Gaywood, King's Lynn, Norfolk, within 14 days of the appearance of this advertisement.

Northmet Sub-area

Hendon District 73/51 R

DISTRICT MANAGER (Reference No. 296)

Applicants should be fully qualified Engineers having sound commercial and engineering experience gained in the management of electricity undertakings with urban and industrial characteristics, and preferably should be Corporate Members of the Institution of Electrical Engineers.

The salary for this appointment will be £1,200 per annum, and the appointment will take effect from January 1, 1952. The Board own a house in the Hendon District which will be available for the successful applicant to rent.

Applications, stating age, education, qualifications and experience, with details of present appointment and salary, should be submitted to The Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet House, Southgate, London, N.14, to arrive not later than Monday, July 16, 1951.

Future salaries and conditions of service for these appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination. (L269)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:

ASSISTANT ENGINEER (Testing and Efficiency) [redacted] Cliff Quay Generating Station.

Salary in accordance with the National Joint Board agreement, Schedule A, Grade 7, Class "J" (£736-£770 per annum), but will be subject to negotiation.

Applicants should possess the Higher National Certificate in mechanical and/or electrical engineering or other equivalent qualifications and have had previous experience in a large generating station.

The successful applicant will be responsible for the efficient and economical operation of the generation plant, the preparation of statistics and the keeping of technical records.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than July 14, 1951. Envelopes should be endorsed "Assistant Engineer (Testing and Efficiency)—Cliff Quay."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (L 284)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Suffolk Sub-Area

Sub-Area Headquarters—Stowmarket (60/51 R.)

THIRD ASSISTANT ENGINEER
(Planning and Development Section)

Candidates should have had a sound technical training and experience in the planning and development of high-voltage systems up to and including 33 kV, particularly the design of sub-stations.

The salary for the appointment will be in accordance with Class "H," Grade 10, of the National Joint Board Salary Agreement, commencing at £571 per annum.

Applications should be submitted to The Manager, Suffolk Sub-Area, Eastern Electricity Board, Finborough Hall, Stowmarket, Suffolk.

Stowmarket District (75/51 N.)

SECOND ASSISTANT ENGINEER

Candidates should have had a sound technical training and experience in the construction, operation and maintenance of h.v. and l.v. overhead and underground systems in a predominantly rural area.

The salary for the appointment will be in accordance with Class "D," Grade 7, of the National Joint Board Salary Agreement, commencing at £563 per annum.

Applications should be submitted to the District Manager, Stowmarket, Eastern Electricity Board, 25 Ipswich Street, Stowmarket, Suffolk.

Both future salaries and conditions of service for these appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, stating age, education, qualifications and experience, with details of present appointment and salary, should be submitted within 14 days of the appearance of this advertisement. (L 331)

DENBIGHSHIRE COUNTY COUNCIL

County Architect's Department

WREXHAM

APPLICATIONS are invited for the following appointment on the permanent staff:—

ASSISTANT ELECTRICAL ENGINEER
A.P.T. Grade V, salary £570-£620 per annum.

Candidates should be Corporate Members of the Institution of Electrical Engineers, possessing adequate technical knowledge and practical experience in the design of installations, including preparation of plans and specifications and the supervision of contracts in connection with electrical lighting, heating and power plants in municipal buildings, including schools and institutions.

The appointment is subject to the provisions of the National Conditions of Service for Local Government Administrative, etc. officers, to the provisions of the Local Government Superannuation Act, 1937, and to the passing of a medical examination, and would be terminable by one calendar month's written notice on either side, to expire at the end of a calendar month.

Applications, giving age, qualifications and particulars of present and previous appointments and accompanied by copies of three recent testimonials, to be sent to the undersigned, by not later than July 25, 1951.

W. E. BUFTON,
Clerk of the County Council.

County Offices, Ruthin.
June 16, 1951. (L 283)

HIS MAJESTY'S COLONIAL SERVICE

A VACANCY exists for an ASSISTANT ELECTRICAL ENGINEER, Railway Department, Gold Coast. The post is either permanent and pensionable or on contract. If on contract the salary would be fixed between £830 and £1,450 per annum. If permanent and pensionable the salary would be in the scale £720 to £1,300 per annum, point of entry in each case depending on experience and war service. For contract appointments a minimum gratuity of £100 for each year of service is payable at the termination of service. In addition to the above a cost-of-living allowance of £114 to £165 per annum is payable.

Candidates, between the ages of 25-50, must be Graduates of the Institute of Electrical Engineers, and have had an apprenticeship with a recognised firm of mechanical and/or electrical engineers.

Furnished quarters at rents of £60 to £150 per annum and free first-class passages each way each tour for the officer and his wife, if married, and children up to three in number and up to nine years of age, are provided. Leave is granted after a tour of 18 months at the rate of seven days for each month of service.

Candidates should write for further particulars and an application form to the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, London, S.W.1, giving brief details of age, qualifications and experience, quoting the reference number 27326/40. (L 315)

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Clyde Sub-Area

APPOINTMENT OF SECOND ASSISTANT ENGINEER PLANNING AND DEVELOPMENT

APPLICATIONS are invited for the position of Second Assistant Engineer in the Planning and Development Section of the above Sub-Area. Applicants should possess a degree in electrical engineering or have equivalent qualifications and have a wide experience in the design and layout of large underground and overhead distribution systems at pressures up to and including 33 kV in industrial and residential areas. A knowledge and application of modern protection equipment, the calculation of fault levels and the preparation of load flow diagrams is essential.

The salary for the post will be in accordance with the National Joint Board Agreement, Class "J," Grade 7, i.e. £736/£770 per annum. The successful applicant will require to satisfy the Board's medical adviser and contribute to a superannuation scheme.

Applications, stating age, education, qualifications, experience, present position and salary, should be received by The Manager, The South West Scotland Electricity Board, Clyde Sub-Area, 206 St. Vincent Street, Glasgow C.2, not later than 14 days after the appearance of this notice. (L 258)

EAST MIDLANDS ELECTRICITY BOARD

Lincolnshire Sub-Area

APPLICATIONS are invited for the position of DEMONSTRATOR in the Grantham district of the Lincolnshire Sub-Area.

Applicants should possess a certificate of a recognised Domestic Training College and preference will be given to those holding the E.A.W. Housecraft Certificate and diploma. Candidates should be competent to give cookery demonstrations, lectures and advice to consumers on the utilisation of electrical appliances.

The salary will be in accordance with Grade 1 of the National Joint Council (Administrative and Clerical Grades) Salary Agreement and the commencing salary will be within the range of £310-£390 per annum (progress beyond £350 per annum will be dependent on a certificate of capability). The appointment will be superannuable under the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, giving particulars of age, experience and qualifications, should be forwarded to the Manager, Grantham District, The East Midlands Electricity Board, 21 High Street, Grantham, so as to arrive not later than Monday, July 16, 1951.

P. H. De KEYSER,
Secretary.
(L 292)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the post of ASSISTANT CHEMIST at Longford Generating Station, Coventry.

Applicants should have had practical experience in the analysis of coal, water, oil, etc., for power station requirements. Preference will be given to candidates possessing the Higher National Certificate in Chemistry or equivalent qualifications.

The salary for this appointment will be in accordance with Class "G", Grade 9, £571 to £597 per annum of the N.J.B. Scale, and the post will be superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and be returned not later than July 13, 1951.

L. F. JEFFREY,
Divisional Controller.
(L 275)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of ASSISTANT SHIFT CHARGE ENGINEER at the Warrington Power Station. Salary £538/£560, being Class F, Grade 9, of the National Joint Board Schedule.

Applicants should have had a good general and technical education and have experience in the shift operation of generating plant. The possession of a Higher National Certificate or similar qualification would be an advantage.

The appointment will be superannuable under the British Electricity Authority and Area Boards' Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary, Clarke Gardens, Wooiton, Liverpool, and should be returned to him not later than Wednesday, July 18, 1951.

A. R. COOPER,
Divisional Controller.
(L 317)

CIVIL SERVICE COMMISSION

PROFESSIONAL ENGINEERS IN GOVERNMENT DEPARTMENTS

THE Civil Service Commissioners announce an Open Competition to be held during 1951 for permanent appointments in many departments of the Civil Service for a wide variety of engineering duties. Applications will be accepted at any time but not later than December 31, 1951, and selected candidates will be interviewed as soon as possible after the receipt of their application forms. Candidates are advised to apply as early as possible.

Age Limits: Candidates must be under 35 on November 30, 1951, with extension for regular service in H.M. Forces and for established Civil Service. For appointments in the post office they must be 21 or over, in the Ministry of Supply, 23, and in all other departments, 25 or over on that date.

Minimum Qualifications vary for different posts. Generally a university degree in engineering or corporate membership of the Institutions of Mechanical Engineers, Electrical Engineers or Civil Engineers, or passes in or exemptions from Sections A and B of the corresponding associate membership examinations, or evidence of exceptionally high professional attainment are required. For certain posts, corporate membership of the Institute of Fuel by examination or the Institution of Chemical Engineers, or graduate membership of the Institution of Chemical Engineers, or associate fellowship of the Royal Aeronautical Society or an honours degree in physics will be accepted instead.

The salary on appointment will be fixed according to age. The salary of men aged 26 in London is £500 rising by annual increments of £25 to £750. Salaries for women and for posts outside London are lower. There are prospects of promotion to higher grades on scales for men in London of £750-£1,000, £1,050-£1,270 and above. These rates are at present under review.

Further particulars and application forms from Secretary, Civil Service Commission, Trinidad House, Old Burlington Street, London W.1, quoting No. S85/51. (L 305)

CROWN AGENTS FOR THE COLONIES

ELECTRICAL ENGINEER (Hydro-electric) required by the Central Electricity Board, Federation of Malay, for three years with prospect of permanency. Salary (including Expatriation Pay) payable in local currency, equivalent at the present Government rate of exchange to £742 a year rising to £1,652 a year. Commencing salary according to age and experience. Cost-of-living allowance equivalent to between £736 and £707 a year according to salary and dependants. Free passages. Liberal leave on full salary. Candidates, between 24 and 35 years of age, must be Corporate members or Graduates of the Institution of Electrical Engineers (or the equivalent), and have had sound training in both electrical and mechanical engineering with experience in the operation of medium electricity supply undertakings. They should possess a competent knowledge of the erection and maintenance of high and low tension overhead and underground a.c. distribution systems and sub-station plant. Experience in maintenance and operation of Diesel engines a distinct advantage. Preference will be given to candidates with experience of hydro-electrical construction. Apply at once, by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M.25728B, on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (L 314)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the following appointments at salaries in accordance with the revised National Joint Board Agreement :—

(a) STATION SHIFT CONTROL ENGINEER at East Power Station, Newport, Class F, Grade 10 (£510-£530 per annum).

(b) ASSISTANT SHIFT CHARGE ENGINEER at Upper Boat Power Station, near Pontypridd, Class H, Grade 9 (£609-£633 per annum).

Applicants for both these appointments should have obtained the Higher National Certificate or its equivalent, served a regular apprenticeship, and obtained in the case of (a) control room experience, and in that of (b) operational experience in a modern power station.

The appointments are superannuable in accordance with the British Electricity Authority and Area Boards' Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below, to whom completed forms should be returned not later than July 9, 1951.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport,
Cardiff.
26th June, 1951. (L 308)

BRITISH ELECTRICITY AUTHORITY

London Division

REQUIRE:—

(a) SENIOR ELECTRICAL DIAGRAM DRAUGHTSMAN
(b) SENIOR MECHANICAL DRAUGHTSMAN.
(c) SENIOR CIVIL ENGINEERING AND BUILDING DRAUGHTSMAN.

Applicants for (a) should be experienced in originating and checking the associated diagrams and protective systems for main generating plant in power stations and substations.

The duties of (b) consist of layout and general design of generating stations, coal-handling plants, ash and dust handling systems and all pipework required for complete installations, and applicants should be familiar with one or more of these.

Applicants for (c) should have wide experience in the preparation of working drawings for: (1) reinforced concrete, (2) heavy structural steelwork and/or (3) building works in connection with generating stations.

Candidates for all these posts should either be obtaining or in possession of a Higher National Certificate, or equivalent, and practical training will be an added advantage.

The salaries will be in accordance with N.J.B. Schedule "D" Class 4/5, i.e. £525 p.a. to £735 p.a., inclusive of London allowance. The commencing salary will be according to the candidate's age, experience and qualifications. The posts are superannuable.

Applications, stating age, qualifications and experience should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, London S.W.1, so as to be received within 14 days of the publication of this advertisement.

J. N. WAITE,
Divisional Controller.
(L 263)

BRITISH ELECTRICITY AUTHORITY

Horsley Towers, near Guildford, Surrey

RESIDENT MANAGER AND MANAGERESS

BRITISH Electricity Authority invite applications from man and wife to manage the Authority's training centre at Horsley Towers, a residential establishment capable of accommodating up to 100 persons.

The successful applicants will be responsible for domestic arrangements, including the supervision of staff and the control of buildings and gardens, and will be required to live in accommodation provided by the Authority. (A resident tutor has responsibility for all matters connected with education and training.) Their combined remuneration will be within the provisional salary range £500 to £600 per annum, according to experience and qualifications, and one or both will be eligible for membership of the Authority's superannuation scheme. Board, excluding laundry, will be free.

Applicants should have experience in the management of a hotel or other residential establishment and should have a sound knowledge of catering.

Letters of application, giving full particulars of qualifications and experience, and the names of two persons to whom reference may be made, should be sent to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, W.1, to be received not later than July 18, 1951.

Please quote Reference AE/183. (L 287)

EAST MIDLANDS ELECTRICITY BOARD

Lincolnshire Sub-Area

APPLICATIONS are invited from suitably qualified candidates for the post of SECOND ASSISTANT ENGINEER (Operation and Protection) in the Lincolnshire Sub-Area.

Candidates should have had extensive experience in the operation and maintenance of a large distribution system and be familiar with the performance, testing and grading of protective gear, high voltage testing, fault localising and conversant with short circuit and voltage drop calculations.

The engineer appointed will be required to reside in Grantham and to undertake standby duty.

The salary will be in accordance with the Revised National Joint Board Schedule, Class "G," Grade 7/1 (£651-£679 per annum), and the appointment will be superannuable under the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, giving full particulars of age, qualifications and experience, together with other supporting documents, should be submitted to the Sub-Area Manager, Lincolnshire Sub-Area, North House, Grantham, so as to reach him not later than July 16, 1951.

P. H. De KEYSER,
Secretary.
(L 281)

BRITISH ELECTRICITY AUTHORITY

South Western Division

STATION SHIFT CONTROL ENGINEER—FEEDER ROAD GENERATING STATION

APPLICATIONS are invited for the position of Station Shift Control Engineer at Feeder Road Generating Station, Bristol.

Applicants should possess good technical qualifications, and have had sound technical training and practical experience in the control and operation of steam generating plant and main switchgear.

Salary and conditions of service will be in accordance with the National Joint Board Agreement Class E, Grade 10, £488-£502 per annum.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, so as to be received not later than July 14, 1951.

R. C. BARRETT,
Divisional Secretary.
28th June, 1951. (L 316)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICANTS are invited for the following appointment:—

SHIFT CHARGE ENGINEER
Letchworth No. 2 Generating Station

Salary will be in accordance with the National Joint Board Schedule "A," Grade 7, Class "D" (£563 to £573 per annum).

Applicants should have served an apprenticeship and obtained an Ordinary National Certificate in Electrical and/or Mechanical Engineering, or equivalent, and possess experience in the operation of generating stations.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than July 14, 1951. Envelopes should be endorsed "Shift Charge Engineer—Letchworth No. 2 Generating Station."

W. N. C. CLINCH,
Controller.
Northmet House,
Southgate, N.14. (L 332)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

ASSISTANT MECHANICAL MAINTENANCE ENGINEER —NORTH WILFORD GENERATING STATION, NOTTINGHAM

APPLICATIONS are invited for the position of Assistant Mechanical Maintenance Engineer (Boiler House) at the North Wilford Generating Station.

Applicants should have had a thorough mechanical training and possess considerable experience in the maintenance of all types of boiler house equipment found in large generating stations. Preference will be given to engineers with experience of pulverised fuel plants and the possession of an Ordinary National Certificate in Mechanical Engineering, or its equivalent, would be advantageous.

The salary is in accordance with Class "K," Grade 8, of the National Joint Board Schedule and the appointment will be superannuable under the terms and conditions of the British Electricity Authority and Area Boards' superannuation scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned not later than July 18, 1951.

L. F. JEFFREY,
Divisional Controller.
(L 304)

SOUTH WESTERN ELECTRICITY BOARD

VACANCY exists for TECHNICAL ASSISTANT, Commercial Department, in the Bristol Sub-Area with headquarters at Bristol.

Commencing salary £609 per annum within Class "J" Grade 10 of the N.J.B. Agreement. Duties will include negotiation with industrial and commercial consumers for large and multiple power contracts, advising large power consumers on questions concerning industrial installations, including power factor correction and utilisation of electricity and research into consumer's load characteristics and costs.

Applications, giving age, present position and salary, qualifications and experience, should reach the Sub-Area Manager, Electricity House, Colston Avenue, Bristol, within ten days. (L 333)

NORTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 1 Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER, South District

The salary will be in accordance with the National Joint Board Revised Agreement, Class "F," Grade 7, i.e. £625 to £634 to £643 per annum.

The duties will include the supervision of the erection and maintenance of sub-station switchgear, laying and jointing of cables, and switching operations on the h.v. and l.v. systems within the district as required.

Applicants should have had a wide general experience on the distribution side of electricity supply. Corporate membership of the Institution of Electrical Engineers will be an advantage.

Applications, stating age, education, qualifications and experience, present post and salary, should be received by the Sub-Area Secretary, No. 1 Sub-Area, The North Western Electricity Board, Town Hall Extension, Manchester 2, P.O. Box 493, not later than Saturday, July 14, 1951.

No. 5 Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER, Rossendale District

The salary will be in accordance with the National Joint Board Revised Schedule, Class "E," Grade 7, i.e. £579 to £594 to £609 per annum.

The successful candidate will be required to assist in the operation, maintenance and construction of underground and overhead mains, sub-stations and transformers and general mains duties, and to undertake stand-by duties.

Preference will be given to candidates who are Corporate or Graduate Members of the Institution of Electrical Engineers, or who possess the Higher National Certificate in Electrical Engineering.

Applications, stating age, qualifications and experience, present post and salary, should be received by R. H. Harral, M.I.E.E., M.Inst.F., Sub-Area Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee Street, Blackburn, not later than Saturday, July 14, 1951. (L 328)

A WELL-KNOWN West Midland engineering company, manufacturers of 2- and 4-stroke internal combustion engines are in need of a first-class DESIGNER ENGINEER for magneto design. Suitably qualified men with a sound technical knowledge in the manufacture and design of magnetos are invited to apply.—Write, in confidence, giving details of age, previous experience and salary required, to Box No. 7071, Electrical Times. Endorse envelope "Personnel Department." (L 206)

AN ENGINEER is required, age 28-30, for development work in process controls specialising on the application of electronics, the post is a new one and will call for the capacity to work independently. Essential qualifications are age 28-30 with degree or Higher National Certificate in Electrical Engineering. The successful applicant will be posted in East Anglia and would be required to do a certain amount of travelling. There is a superannuation scheme, entry to which is dependent upon a satisfactory probationary period. The salary offered is £680 per annum. —Write, giving details of qualifications and experience to Box No. 7055, Electrical Times. (L 164)

ASSISTANT DESIGNER required in Capacitor Dept. Duties will include the design of L.T. and H.T. capacitors for industrial purposes, preparation of power-factor correction schemes, etc. Candidates should have sound electrical training and experience, and hold Higher National Certificate or other qualifications. Five-day week. Good conditions. Pension scheme. Sports facilities. Applications, stating age, training, experience and salary expected, should be addressed to Employment and Welfare Manager, Johnson & Phillips, Ltd., Charlton, S.E.7. (L 274)

ASCO Ltd., are prepared to appoint SALES AGENTS for commercial refrigeration equipment in selected territories.—Asco Ltd., Refrigeration Division, Broadheath, nr. Manchester. (K 737)

CIVIL Engineering Contractors in Liverpool (Kirkby) require DRAUGHTSMEN for arrangements of electrical equipment. Mechanical or electrical experience desirable but not essential. Age 18-30. Salary according to age and ability. Applications, in writing, to The Staff Officer, B.I.C.C. Ltd., Prescot, Lancs. (L 298)

CHRISTY BROS Ltd., 171 Broomfield Road, Chelmsford, have a vacancy for an ASSISTANT ESTIMATOR thoroughly experienced in all types of electrical installation work.—Reply, stating age, experience and salary required. (L 291)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

DESIGN DRAUGHTSMAN required by old-established firm of automatic electric control gear manufacturers in Home Counties. Experience in design of automatic contactor gear essential. Modern factory, 5-day week, canteen, incentive bonus, superannuation scheme. —Write, stating age, experience and salary required, to Box No. 8013, Electrical Times. (L 303)

DESIGN ENGINEER required by successful old-established company in the North of England, engaged particularly in the manufacture of heavy duty d.c. switchgear. He should have scientific and commercial qualifications as well as practical experience, originality and initiative. He would have unlimited opportunity for developing his ability at a good salary, rising without limit according to his performance. To the right man the future prospects are bright.—Box No. 8079, Electrical Times. (K 805)

DISTRIBUTION CONTROLLERS. The Steel Company of Wales Ltd., invites applications for the post of Distribution Controllers. Candidates must have a sound technical training and be conversant with switchboard operations on large E.H.T. systems.

Applications, giving qualifications and experience, should be addressed to the Personnel Superintendent, The Steel Company of Wales, Ltd., P.O. Box No. 3, Port Talbot. (L 334)

DRAUGHTSMEN AND ENGINEER DESIGNERS required for traction control gear. Men having good mechanical experience would be considered. Good remuneration for men of first-class experience.—Apply, quoting "Switchgear," to Staff Manager, The General Electric Co. Ltd., Witton, Birmingham 6. (L 174)

DRAUGHTSMEN. Expanding activities of established London engineering company provide prospects for Senior Draughtsmen with building, electrical or mechanical experience, and personal initiative. Applicants for the permanent and pensionable positions should state chronological history and salary required within range £10 to £11. Apply to Personnel Manager, Standard Telephones and Cables Ltd., N. Woolwich, London E.16. (L 297)

DRAUGHTSMEN required with experience of electrical wiring accessories or similar field. Interesting work on new development with established company situated in S.E. London.—Apply, giving full details of experience, to Box No. 8003, Electrical Times. (L 277)

DRAUGHTSMAN required (Walthamstow Area). Applicants must have served apprenticeship and have had good general experience. Good working conditions. Pension scheme. Reply, stating age, experience and salary required to Box No. 8019, Electrical Times (L 233)

ELECTRICAL AND MECHANICAL ENGINEERS and metallurgists are required for experimental work at the Research Laboratories of The General Electric Co., Ltd., East Lane, North Wembley, Middlesex. Graduate staff are needed for work on radio-communications, domestic heating appliances, illumination, light mechanical engineering problems and in the metallurgical field.—Applications, giving age and record, should be sent to the Staff Manager (Ref. GBLC/429). (L 244)

ELECTRONICS : Assistant required in electrical section of an industrial concern in the Brentford area, for designing valve and photocell applications to plant within the factory. Ability to make up the apparatus an advantage. Wage approximately £9 to £10 per 44-hour week. —Reply, stating age, training and experience, to Box No. 8017, Electrical Times. (L 311)

ELECTRICAL ENGINEER with 3-5 years post graduate experience is required for the design of special types of small motors and generators to form part of a complete electro-mechanised system. Applications, in writing, to be sent to the Staff Manager (Ref. GBLC/441), Research Laboratories of The General Electric Co., Ltd., Eas Lane, North Wembley, Middlesex, stating qualifications age and experience. (L 258)

ELECTRICAL INSTRUMENT MECHANIC required by Kuwait Oil Co., Ltd., Full apprenticeship with reputable instrument manufacturer essential, and experience in manufacture and servicing of all types of electrical meters and instruments, including protective relays, automatic voltage regulators, etc. Higher National Certificate desirable. Age under 35. Salary dependent qualifications and experience, plus living allowances. Kit allowance pension scheme. Write, giving details to Box "L.V.", c/o J. W. Vickers and Co., Ltd., 7/8 Great Winchester Street, London, E.C.2. (L 312)

ELECTRICAL TECHNICAL INSTRUCTOR required by the Kuwait Oil Company for overseas service in the independent Arab State of Kuwait. Candidates must have served a full apprenticeship and should possess a sound knowledge of all types of electrical installation and maintenance. Knowledge of the east and previous experience as an instructor an advantage. Starting salary £710 p.a. plus generous living allowances. Age 30-45; kit allowance; pension scheme.—Write, giving full details and quoting K.1263, to Box "D.J." c/o J. W. Vickers and Co. Ltd., 7/8 Great Winchester Street, London E.C.2. (L 307)

FERRANTI LIMITED invite applications for senior appointments of Graduate Engineers with industrial experience in electrical measurements, particularly in electrical integrating energy metering, both industrial and commercial, together with knowledge of testing equipment and facilities. The posts to be filled carry senior responsibility with excellent prospects, generous salary and pension.—Application forms from Mr. R. J. Hebbert, Staff Manager, Ferranti Limited, Hollinwood, Lancs. Please quote reference M.E. (K 744)

FOR BRITISH COLUMBIA. Pacific Coast Canadian Pulp and Paper Mill requires experienced MAINTENANCE AND CONSTRUCTION ELECTRICIANS. Applicants should have knowledge of h.t., a.c. generation and distribution, a.c. and d.c. motors and control, hoists, cranes, elevators, transformers. Possession of ordinary National E.E. Certificate an advantage.
Apply, in writing, to James Bird, c/o Canadian Immigration Department, 18 Woodlands Terrace, Glasgow, Scotland. All applications will be sent forward to B.C. (L 336)

JOHNSON AND PHILLIPS LTD. have a vacancy for a TRANSFORMER DESIGNER experienced in dealing with all sizes up to 10 M.V.A. This is an attractive opening for a progressive man. Five-day week, staff pension and bonus scheme, good welfare facilities, sports club with private sports ground catering for cricket, tennis, Association and Rugby football. Work's canteen with licensed bar and equipped for billiards, table tennis, amateur dramatics, etc.—Applicants should state age, experience, training and salary required and be addressed to Employment and Welfare Manager, Johnson and Phillips Ltd., Victoria Works, Charlton, London S.E.7. (L 269)

JOINTERS MATES required immediately. Must be willing to travel. London rate of pay and out allowance.—Write, stating age and experience, to Box No. 7087, Electrical Times. (L 223)

JOURNEYMAN PLUMBER JOINTERS required immediately. London rate of pay and out allowance.—Write, stating age and experience, to Box No. 7085, Electrical Times. (L 222)

JUNIOR ELECTRICAL ENGINEER required by consulting engineers in Victoria district. Must have had some experience in the preparation of power and lighting installation schemes for hospitals, schools, factories, etc. Excellent prospects for suitable applicant—Apply to Box No. 7067, Electrical Times, stating age, experience, qualifications and salary required. (L 204)

LIGHTING ENGINEER with good knowledge of modern lighting practice required in London, chiefly for planning and estimating for commercial and industrial lighting schemes. Applications, stating age and experience to Box No. 8015, Electrical Times. (L 310)

MILITARY COLLEGE OF SCIENCE require CIVILIAN INSTRUCTORS (Technical Grade III) (unestablished) to instruct in the following trades:—Foundry work (moulding and metal-melting) Smithcraft (hand and power forging and heat treatment); machining (grinding, surface, cylindrical, gear and cutter); electrical winding and allied processes. Candidates must have undergone a period of recognised training in their trade, followed by not less than five years practical experience as skilled craftsmen. Good instructional ability and some teaching experience will be an advantage. Salary is on the range £437-£545. Starting salary will be fixed according to age, qualifications and experience. Annual increases are payable subject to satisfactory service. An assisted travel scheme is in operation between both Swindon and Faringdon and the College. Written applications, giving date of birth and education, full details of qualification and experience of posts held (including dates), should be addressed to Appointments Officer, Ministry of Labour and National Service, 1-6 Tavistock Square, London W.C.1, quoting reference number J.A.17, within 14 days of appearance of this advertisement. In no circumstances should original testimonials be forwarded. Only candidates elected for interview will be advised. (L 234)

QUALIFIED SENIOR ASSISTANTS to consulting electrical engineer required. Fully conversant with design and supervision of electrical and lift installations in industrial, commercial and domestic premises.—Details to T. P. Bennett and Son, 43 Bloomsbury Square, W.C.1. (L 159)

REPRESENTATIVE required for the South Western Area by old-established manufacturers of high-class lighting fittings, accessories and open-type switchgear. A sound connection with electrical wholesalers, electricity showrooms and industrial undertakings in that area essential. Apply, with full details, in confidence, o Box No. 8021, Electrical Times. (L 324)

SALES MANAGER required by large, long-established engineering company. Must have first-class technical knowledge, preferably with university degree in electrical engineering. Extensive experience of electronics essential. Position offers wide scope for really live man possessing initiative and sales ability of high order. —Apply, giving full details of age, education and positions held, to Box No. 8007, Electrical Times. (L 279)

SENIOR DESIGNER - DEVELOPMENT ENGINEER required by leading manufacturer of domestic and light industrial electro-mechanical control devices in West London. Only men of proved experience and success in most modern practice need apply. First-class opportunity for advancement. Fullest particulars of qualifications, career to date and salary required in confidence, to Box No. 8011, Electrical Times. (L 302)

SENIOR SWITCHGEAR DESIGNER required with experience of indoor and outdoor oil break equipment, 33 kV upwards. Applicants will be required to take responsibility for designs up to the production stage. The position offers good prospects to the right man. Minimum qualifications, graduate or corporate membership of the I.E.E. House available to married man; superannuation scheme; modern factory.—Applications, giving full details of experience and technical education, to the Personnel Manager, South Wales Switchgear Ltd., Blackwood, Mon. (L 229)

WANTED, JUNIOR CONTRACTS ENGINEER, preferably with drawing office experience. Excellent prospects, good salary.—Apply, Edmundsons Electric Co., Ltd., 24-30 Gillingham Street, London S.W.1. (L 146)

WORKS DRAUGHTSMAN required for light electrical manufacturers in Croydon area with preferably some experience of design of sheet metal work.—Write, stating age, and salary required, to Box W.556, Willings, 362, Gray's Inn Road, London, W.C.1. (L 335)

APPOINTMENTS WANTED

ASSISTANT SALES MANAGER, A.M.I.E.E. Switchgear and associated equipment, desires change. Midland or Southern area preferred.—Box No. 7099, Electrical Times. (L 254)

WANTED

A.C./D.C. MOTORS, STARTERS, complete changeover installation, etc.—A.A. Electrical Co. Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 20)

BALL RACES WANTED. Large quantities required, surplus or redundant stocks. Wide range of sizes and types including ¼, ⅜, ½, ⅝, ¾ and 1 in. 4, 5, 6, 7 and 9 mm. bore.—Offers to D. C. Woodberry, Treforest Trading Estate, Glam. (L 227)

ISENTHAL VOLTAGE REGULATORS WANTED. Any condition.—Box No. 7069, Electrical Times. (L 205)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write Elton Levy Co. Ltd., St. Ermin's (West Side), Caxton Street, London S.W.1. Tel.: WHItehall 9621/2/3. (A 3)

STEEL, ALUMINIUM, BRASS, Sheets, Strip, Bars, Off-cuts. Any quantity—immediate payment.—Grades Sheared Metal Co. Ltd., Green Lane, Hounslow, Middx. Tel.: Feltham 3274. (L 77)

WANTED, SCRAP ELECTRIC MOTORS, DYNAMOS AND CABLE. Top prices paid.—H. Reed, 36 Bridge Street, Leatherhead, Surrey. (K 11)

WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co. Ltd., 22-26 Britannia Walk, London N.1. (A 13)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 8631 (4 lines). —Service Electric Co. Ltd., Stanmore, Middx. (D 324)

ARMATURE SERVICE CO. LTD., Haddington Street, Hove (Tel.: 32996), electrical engineers and winding specialists. Distance no object. (F 739)

S. C. H. Co.

4b STANLEY ROAD, SOUTHEND-ON-SEA

Having the organisation to produce Trade Work from Blue prints to mass production competitively, are prepared to supply to Electricians for demonstration purposes

WARM o' COOL UNIT HEATERS

Particulars on request. (H 540p)

CASTINGS, Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (L 318)

METALWORK. All types cabinets, chassis, racks, etc., to your own specifications.—Philpott's Metalworks Ltd., Chapman Street, Loughborough. (L 228)

AGENCIES

AGENT required for Birmingham and Midlands by manufacturers of industrial electric lighting and heating equipment. Commission only. Particulars to Box No. 6009, Electrical Times. (L 290)

AN energetic oriental B.Sc. in electrical engineering, M.I.E.E., has lately retired from a high and responsible Government post in India after over 20 years' service, and set up an import and export business in London. He has wide experience in electrical and mechanical engineering matters and influential contacts in Pakistan. Will those desirous of promoting their interests in Pakistan in engineering or any other trade communicate with him at Box No. 7061, Electrical Times. (L 201)

ENGINEERING AND LIGHTING EQUIPMENT CO., LTD., Sphere Works, St. Albans, Herts., require AGENTS (preferably with knowledge of commercial, industrial and street lighting fittings), who have established contacts with borough engineers and surveyors and British Electricity Authorities in the following counties: Dorset, Wiltshire, Devon, Somerset, Cornwall and Gloucester. Also, Kent, Sussex, Surrey and Hampshire. (L 313)

TWO men with excellent connections in all branches of electrical industry, shipbuilding, principal industrial and manufacturing concerns, public bodies, etc. (Scotland) seek agency for engineer supplies, plant or speciality equipment. Address 2561 Wm. Porteous and Co., Glasgow. (L 295)

MANUFACTURERS of accessories, open-type switch and fuse gear and high-class lighting fittings invite applications from established AGENTS with good connections with electrical wholesalers, electricity showrooms and industrial undertakings in the South Western Area. Apply Box No. 8023, Electrical Times. (L 325)

FOR SALE

CABLES & WIRE

ALL types T.R.S. and V.I.R. CABLE from Stock, at keenest prices in the trade. Send for List.—Northern Industries, Snow Hill, Manchester, 4. (D 50)

V.I.R. taped, braided and compounded and tough rubber sheathed CABLES, fully complying with B.S.S. specification but non-standard lengths. First-rate quality, ex works. Must be actual user. Box No. 8005, Electrical Times. (L 278)

DOMESTIC APPLIANCES

IMMERSION HEATERS. Grubb 4 kW. No purchase tax. All lengths, 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed. Write for illustrated brochure, latest lists and trade terms to distributors.—John Owner and Co. Ltd., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

ENGINEERING PLANT & MATERIALS

5 TONS GALVANISED OFFCUTS, mixed 14/20 gauge, 1¼ in. to 9 in. wide, 24/48 in. long.—Trevor Davies Lodge Yard, Briton Ferry. Tel. 2166. (L 153)

GENERATING PLANT

BRITISH ELECTRICITY AUTHORITY

North Western Division

TENDERS are invited for the purchase, dismantling and removal of the following redundant plant situated at Bloom Street Generating Station, Manchester, 1:

(1) One 10,000 kW "Westinghouse-Rateau" TURBO-ALTERNATOR and associated equipment, comprising condenser, water, air, booster and extraction pumps, water tanks, valves, etc. The generator only is not in working condition.
(2) One A.C.-D.C. MOTOR GENERATOR, comprising 53 h.p. motor and 400 volts, 70 amps, 3-phase, 50 cycles generator.
(3) Miscellaneous small L.V. SWITCHGEAR, not in working order.
(4) Five ELECTRIC MOTORS (various), in working order.

General conditions and form of tender may be obtained from the undersigned and completed tenders to be returned not later than July 25, 1951.

The Authority does not bind itself to accept the highest or any offer.

P. H. FLATT,
Divisional Secretary.

British Electricity House, Wilmslow Road,
East Didsbury, Manchester, 20. (L 293)

DIESEL GENERATING SET, 220 v. d.c. "Tangye" 34 b.hp.. Diesel engine "Magstarlite" 28.5 kW generator, slate control panel 5 ft. x 2 ft. 6 in., voltmeter, ammeter, control resistance and double pole main switch. Very reliable plant.—Inspect, W. England, F. J. Edwards, Ltd., 359, Euston Road, London, N.W.1. (L 296)

LIGHTING EQUIPMENT

FLUORESCENT FITTINGS. 5 ft 80-watt hexagon battens, complete all control gear; guaranteed 12 months; 49s. 6d., ex works.—M.E.S., 117 Hornsey Road, N.7. (North 4923). (L 160)

PURLEY CHOKES AND BALLASTS. Our 80w Tapped h.p.f. Ballast, with Starter Switch-holder incorporated, is proving itself the most popular unit. Suitable for most fittings, 57/6 each, subject.—F. W. Blanshard Ltd. (Dept. ET), Purley, Surrey. Uplands 4818/9. (E 343)

METERS

CITY OF BELFAST

Electricity Department

SALE OF OFF SERVICE D.C. ELECTRICITY METERS

TENDERS are invited for the purchase of off service d.c. electricity meters.

Forms of tender may be obtained and the meters inspected at the Electricity Department, East Bridge Street, Belfast.

Each tender, in sealed envelope marked "Tender for Off Service D.C. Electricity Meters, Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Monday, July 16, 1951.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The highest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
June 29, 1951. (L 322)

A.C/D.C.— QUARTERLY AND SLOT-METERS. Guaranteed, sent on approval if desired.—Brent Electrical Co., 6 Holmdale Gardens, London N.W.4. (A 15)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

METERS, a.c. and d.c., new and reconditioned, all types. Quarterly, single and three-phase, 3 and 4 wire, 2½ to 1,000 amps. Prepayment, single and double tariff, single, dual and triple coin, fixed and variable tariff, 2½ to 50 amps. M.D.I., Billiards Switches, Rent Collectors. Prices from 5/- carriage paid, guaranteed for ever, immediate delivery. Illustrated catalogue from The Electric Meter Company, Castor Road, Brixham. (K 678)

MOTORS & STARTERS

A. A. ELECTRICAL CO. FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

A.C. and D.C. MOTORS, all sizes, large stocks fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22. (Forest Hill 2278-9). (A 10)

A.C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8631/4. (A 476)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7232. (A 12)

ELECTRIC MOTORS. Special purchase of unused electric motors made by ALPHA HARRIS to B.S.S.168. All standard industrial machines, enclosed ventilated, with endshield B/R bearings and standard shaft extension. Starters available. Immediate delivery. All covered by our 12 months' guarantee.

Qty.	*H.P.*	*Type*	*Voltage*	*Speed*
8	30	SR	400/440/3/50	1500
50	18	SR	400/440/3/50	1500
60	10	SR	400/440/3/50	1500
45	7½	SR	400/440/3/50	1500
5	25	SC	400/440/3/50	1500
15	20	SC	400/440/3/50	1500
26	15	SC	400/440/3/50	1500
4	12½	SC	400/440/3/50	1500
30	5	SC	400/440/3/50	1500
50	4¼	SC	400/440/3/50	1500
4	3	SC	400/440/3/50	1500
50	2	SC	400/440/3/50	1500
6	1	SC	400/440/3/50	1500
47	2	Split ph.	230	1500
26	1	Split ph.	1/50	1500
42	15	DC	220	1300
46	7½	DC	220	1500
50	5	DC	220	1500
34	15	DC	110	1400
76	12	DC	110	1350
16	9	DC	110	1200
16	7½	DC	110	1200
7	6	DC	110	1450
14	6	DC	110	1200
10	5	DC	110	1450
14	5	DC	110	1200

George Cohen, Sons & Co., Ltd., Wood Lane, London, W.12. Tel.: Shepherds Bush 2070; and Stanningley, Nr. Leeds. Tel.: Pudsey 2241. (L 292)

FOR ELECTRIC MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SALE BY TENDER

THE Merseyside and North Wales Electricity Board offers for sale the undermentioned equipment available for disposal:

1. A Laurence Scott MOTOR No. 6062, 10 h.p., 29 amps 300 volts, 300/600 r.p.m., arranged for direct coupling to a water turbine.
2. A Laurence Scott MOTOR similar to above, but numbered 6061.
3. A Crossley single cylinder OIL ENGINE, 26 b.h.p., 340 r.p.m., complete with fuel injection system, 400 gallon storage tank, water cooling tanks and exhaust system, flywheel, and vee belt pulley drive.
4. An electric construction DYNAMO, No. 126259, 15 kW, 230 volt, 68 amp., 1,060 r.p.m.
5. Two D.C. SWITCHBOARDS.

These items of equipment are offered for sale individually or as a whole, without guarantee as to their condition.

The equipment is situate at Upper Mill, Glyncoiriog, Nr. Wrexham and appointments to inspect the equipment should be made with Mr. E. J. Brett, the Board's District Engineer at Legacy, Nr. Wrexham.

Forms of tender, obtainable from the Manager, No. 4 Sub-Area, Merseyside and North Wales Electricity Board, Electricity House, Rhostyllen, Nr. Wrexham, must be forwarded through the post duly sealed in the official envelope provided, so as to be received at Electricity House, Rhostyllen, Nr. Wrexham, not later than the first post on Monday, July 30, 1951.

The Board do not bind themselves to accept the highest or any tender, and reserve the right to accept any portion of a tender.

JAMES RANKIN,
Secretary.

Love Lane, Electricity House,
Pall Mall, Liverpool.
June 26, 1951. (L 300)

ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.
STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC

Any voltage, new, short delivery, all types of revolving electrical power.

ELECTROPOWER COMPANY LIMITED

Kingsbury Works, Kingsbury Road, London N.W.9
Telephone: COLindale 4621/2. (D 17p)

ONE Hopkinson Slip Ring Induction Elec. MOTOR, 10 h.p., 480 V, single-phase, 950 r.p.m., with faceplate starter; in good cond.; recently overhauled; £60 or near offer.—Geo. Jarvis & Co., Ltd., 58 Church Street, Weybridge. (L 326)

SWITCHGEAR

B.C.S. SWITCHGEAR.

(1) 10-panel Metalclad Allen West drop-down truck type C.B.1 low tension SWITCHBOARD, new 1940, 400/3/50, complete with circuit breakers, 750 amps, capacity, 15 MVA rupturing capacity, all necessary relays, instruments, transformers, etc., new 1940.

(2) Two 300 amp. h.t. draw-out type SWITCH CUBICLES by Ferguson Pailin; 11 kV, rupturing capacity 50 MVA, complete with all instruments, etc.

(3) 150 amp. hour Alkium Alkaline BATTERY by Britannia Batteries, type K.15H; having 24 batteries each of 8 cells, carried on timber battery stand, complete with 2 Westinghouse metal rectifiers and Westinghouse charging and control board.

B.C.S. (Engineers and Contractors) Ltd., 3 Castle Street, Cardiff. Tel.: Cardiff 8512/3/4. (L 255)

MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London, N.22. Tel.: Bow 7221. (C 175)

TRANSFORMERS & CONVERTORS

ONE E.E.C. TRANSFORMER, 430 kVA, 10,750-400 V, 3-phase, 50 cycles, B.S.S. 171-1927, oil-cooled impedance volts 3.8 per cent.

One Davenset 7.5 kVA, 360/440 V, 3-phase, 50 cycles, AUTO-TRANSFORMER Plating Rectifier, d.c. volts 7.5, 500 amps. Price, £105

One G.E.C. MOTOR-GENERATOR SET on bed-plate, comprising Squirrel-Cage Motor, 55 h.p., 400 V, 3-phase, 50 cycles, 725 r.p.m. Generator 440 V, d.c., 35 kW with Ellison Starter. Price, £105

One NEWTON PLATING SET on bed-plate, comprising Squirrel-Cage Motor, 5 h.p., 400 V, 3-phase, 50 cycles, 950 r.p.m. Generator 20V, 100 amp. with Ellison Starter. Price, £37 10s.

The Birmingham Power Transmissions Ltd., 56/62 Miller Street, Aston, Birmingham 6. Tel.: Aston 2068 (L 225)

UNCLASSIFIED

FAN MOTOR CARBONS, several thousand Carbon Brushes, Link B/7222, 7 m/m x 5 m/m x 15 m/m long, spring 25 m/m long. 30/- per 100. 117/6 per 500. A. B. Electrical Co., Cotton Street, Hyde. (L 308)

VACUUM CLEANER DUST BAGS. Best quality cloth. Trade enquiries invited. Electric Products, 13, Belgrave Road, Birkdale. (L 288)

MISCELLANEOUS

CITY AND GUILDS (Electrical, etc.) on "No pass—No Fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 176-page handbook, FREE and post free. B.I.E.T. (Dept. 39), 17 Stratford Place, London W.1 (D 244).

IT is desired to secure the full commercial development in the United Kingdom of British Patent No. 600,711, which relates to "ELECTRICAL SLEEVE COUPLING AND TERMINAL CONNECTORS," either by way of the grant of licences or otherwise on terms acceptable to the Patentee. Interested parties desiring copies of the patent specifications should apply to Stevens, Langner, Parry and Rollinson, 5 to 9, Quality Court, Chancery Lane, London, W.C.2. (L 299)

RICHARDS AND PARTNERS, associated with George Offord and Co., Auctioneers and Valuers of PLANT AND MACHINERY AND INDUSTRIAL PROPERTY, Granville House, Arundel Street, London W.C.2. Tel.: TEMple Bar 7471. (A 23)

INDEX TO ADVERTISERS

Alton Battery Co., Ltd. 45
Arrow Electric Switches, Ltd. 7
Attwater & Sons, Ltd. 76
Automatic Coil Winder & Electrical Equipment Co., Ltd. 47
Automatic Light Controlling Co., Ltd. 66
Automatic Telephone & Electric Co., Ltd. 43
Benjamin Electric Ltd. 3
B. & H. (Nottingham), Ltd. 66
Bowker, S. O., Ltd. 16
Bray, George, & Co., Ltd. 66
British Driver-Harris Co. Ltd. 64
British Insulated Callender's Cables, Ltd. 35
British Iron & Steel Federation 11
British National Electrics, Ltd. 32
British Thomson-Houston Co., Ltd. 49, 82
Brook Motors, Ltd. 79
Burco, Ltd. 4
Cable Makers Association 39
Clang, Ltd. 76
Crane, Walter 66
Cressall Manufacturing Co., Ltd. 4
Crompton Parkinson, Ltd. 36
Drubel Distributors, Ltd. 78
Eagle Engineering Co., Ltd. 68
East London Mica Works 34
Edwards, F. J., Ltd. 78
Electric Construction Co., Ltd. 2
Electrical Contractors Trading Association 70
Electrical Times 78
Electro Mechanical Manufacturing Co., Ltd. 80
Elliott Brothers (London), Ltd. 9
English Electric Co., Ltd. 29, 69
Evershed & Vignoles, Ltd. 73
Ferranti, Ltd. 44
Fluxite, Ltd. 76
General Electric Co., Ltd. 41, 52, 67
Gent & Co., Ltd. 28
Gledhill-Brook Time Recorders, Ltd. 42
Grimmer, W. H. 76
Hardy & Padmore, Ltd. 12
Hart Accumulator Co., Ltd. 24
Heatrae, Ltd. 14
Henley's W.T. Telegraph Works Co., Ltd. 53
Higgs Motors, Ltd. 10
Igranic Electric Co., Ltd. 18
Imperial Chemical Industries, Ltd. 8
Isenthal & Co., Ltd. 12
Johnson & Phillips, Ltd. 17
London Electric Wire Co., & Smiths, Ltd. 71
Low, Duncan, Ltd. 16
Marshall 5
McGeoch, William, & Co., Ltd. 42
McKechnie Brothers, Ltd. 68
Metafiltration Co., Ltd. 30
Metropolitan-Vickers Electrical Co., Ltd. 19
Metway Electrical Industries, Ltd. 24
Midland Electric Manufacturing Co., Ltd. 1
Mudie's Electrical Co., Ltd. 38
Nalder Brothers & Thompson, Ltd. 31
National Cash Register Co., Ltd. 78
Newton Brothers (Derby), Ltd. 74
Newton & Co., Ltd. 42
Nu-Swift, Ltd. 72
Parmiter, Hope & Sugden, Ltd. 81
Partridge, Jones & John Paton, Ltd. 33
Reyrolle, A. & Co., Ltd. 65
Rowlands Electrical Accessories, Ltd. 37
Record Electrical Co., Ltd. 25
Rozalex, Ltd. 16
Sanders, Wm., & Co. (Wednesbury), Ltd. 70
Sangamo Weston, Ltd. 54
Santon, Ltd. 27
Saxonia Electrical Wire Co., Ltd. 78
Scemco, Ltd. 30
Scott, H. J., & Co., Ltd. 38
Scottish Cables, Ltd. 75
Shupak, W., & Co., Ltd. 4
Siemens Brothers & Co., Ltd. 21
Siemens Electric Lamps & Supplies, Ltd. 77
Simmonds & Stokes, Ltd. 72
Smart & Brown (Engineers), Ltd. 15
Smith, Herman, Ltd. 34
Smith Meters, Ltd. 50
Steatite & Porcelain Products, Ltd. 46
Sunvic Controls, Ltd. 26
Tant, W. H. & Co., Ltd. 48
Taylor Tunnicliff & Co., Ltd. 13
Thorpe, F. W., Ltd. 74
T. M. C. Harwell (Sales), Ltd. 20
Venner Time Switches, Ltd. 23
Wakefield, C. C. & Co., Ltd. 22
Wandleside Cable Works, Ltd. 72
Westinghouse Brake & Signal Co., Ltd. 6
Wiggin, Henry, & Co., Ltd. 40
Wireohms, Ltd. 72
Wootton & Co., Ltd. 26
Wilden, George 70

"NICHROME"

Specialists in

NICKEL *and* NICKEL ALLOYS

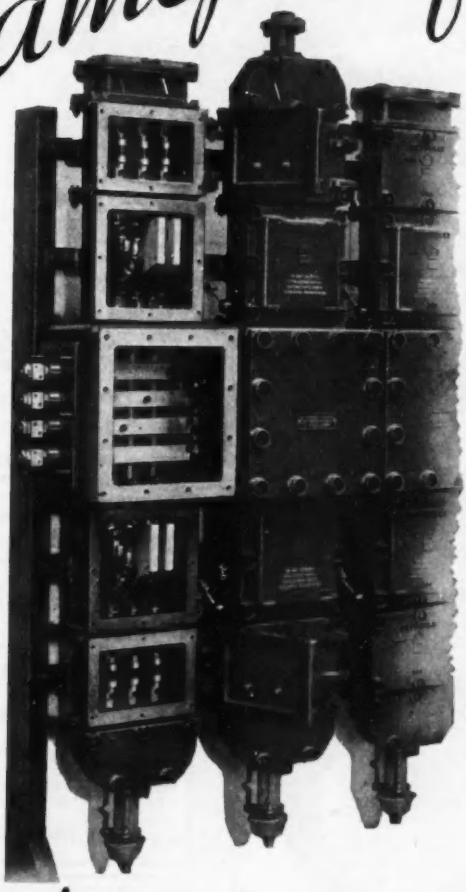
in all commercial forms

for every industry

BRITISH DRIVER-HARRIS COMPANY LTD

MANCHESTER

Flameproof FLP



Double-circuit air-break switch and fuse units up to 200 Amps

Suitable for FLP Categories 1 & 2

HH *distribution gear*

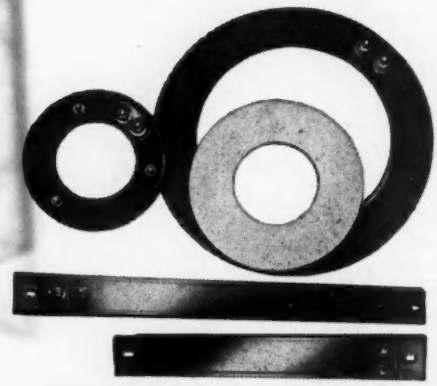
HEBBURN REYROLLE CO. DURHAM ENGLAND

E

BUILT TO STAND THE TEST OF TIME

Edinburgh Castle

CERAMIC EMBEDDED AND METAL CLAD INDUSTRIAL AND DOMESTIC ELECTRIC HEATING ELEMENTS



GEO. BRAY & CO. LTD.

LEICESTER PLACE. LEEDS 2.

Tel. 20981 (8 lines) 'Grams. "Bray Leeds 2"

"BERMEX"

B 1300

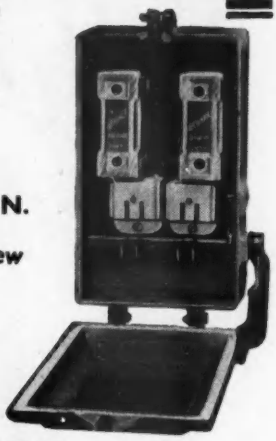
Combined Switch and Fuses

250 Volts D.P. and S.P.N.

One of our new designs

Send for 36-page Catalogue

NOW READY



B&H (Nottm.) LTD.

POPHAM STREET : NOTTINGHAM

Telephone 43826 Telegrams: "VOLTS," Nottm.

LONDON OFFICE: 47-49 CALEDONIAN ROAD, London, N.1.

USE **"GUNFIRE"** TRADE MARK

Time Switches

AND

Process Timers

FOR SATISFACTION

AUTOMATIC LIGHT CONTROLLING CO. LTD., BOURNEMOUTH

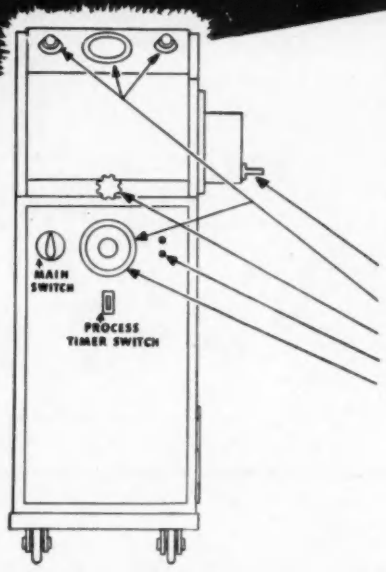
Established over Fifty Years.

ELECTRIC MOTORS

Fractional — 50 H.P.
Repaired and Rewound

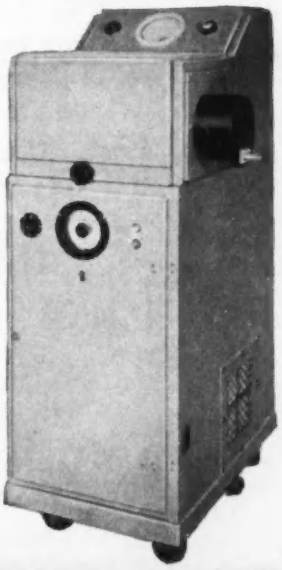
WALTER CRANE
GREENCOAT WORKS, WAKEFIELD

EACH of these features is important



New and improved method of coil connection
Single valve oscillator
Rapid re-matching
Variable position of heater inductor
Full circuit protection
Rails provided to support work-table

Easy coil replacement with improved method of connection
At a glance indicators
Variable output control
Finger-tip H.T. control
Automatic process timing



— ***COMBINED*** *they give versatility and reliability and set a new standard of low maintenance costs*

G.E.C.

2 kW INDUCTION HEATER

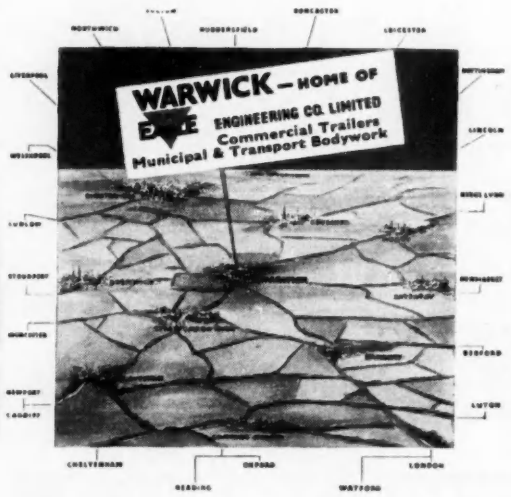
AVAILABLE IMMEDIATELY

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

You cut costs if you know the drill!

In mining and quarrying the name Victor Drills is a by-word for efficient trouble-free rotary drilling. We are proud to think that McKechnie extruded brass bar plays a not inconsiderable part in the careful accurate construction of these really tough tools. The use of extruded brass and bronze alloys is constantly growing—sometimes more than half the machining costs can be cut.

McKECHNIE BROTHERS LTD.
Metal Works: Rotton Park Street, Birmingham, 16. *Branch Offices:* London, Leeds, Manchester, Newcastle-on-Tyne. *Copper Sulphate & Lithopone Works:* Widnes, Lancs. *South African Works:* McKechnie Brothers S.A. (Pty.) Ltd., P.O. Box No. 382, Germiston, S.A.



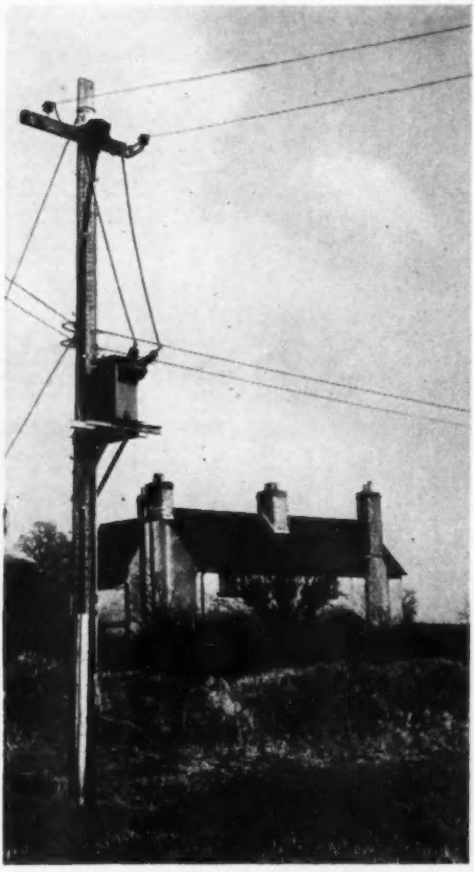
If business or pleasure brings you to Warwick or maybe some nearby beauty spot, of which there are many, why not pay us a visit?
That multiplicity of body types that are made at the EAGLE Works will be in course of production and maybe we can show you something which would take care of that Transport or Municipal problem "at home."
Please write us for further particulars of our vehicle types—we are at your service.

EAGLE ENGINEERING CO. LTD. · WARWICK · ENGLAND
Telephone: Warwick 126-7-8 **Telegrams: "Eagle Warwick"**

5502C

'ENGLISH ELECTRIC'

transformers



for rural electrification

'English Electric' standard distribution transformers continue to make a major contribution to the effort to bring electricity to the greatest possible number of farms and homes, not only in Britain but in many countries overseas.

Years of experience and progressive research have kept 'English Electric' in the forefront of transformer development — from the smallest transformers for electronic devices to the largest power transformers for the highest voltages.

Details of the complete range of standard distribution transformers will be supplied on application to Transformer Sales & Contracts Department, The English Electric Company Ltd., East Lancashire Road, Liverpool, 10.

The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Transformer Dept., Liverpool

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

TDIS.1

Guaranteed Electrical Installations

Membership

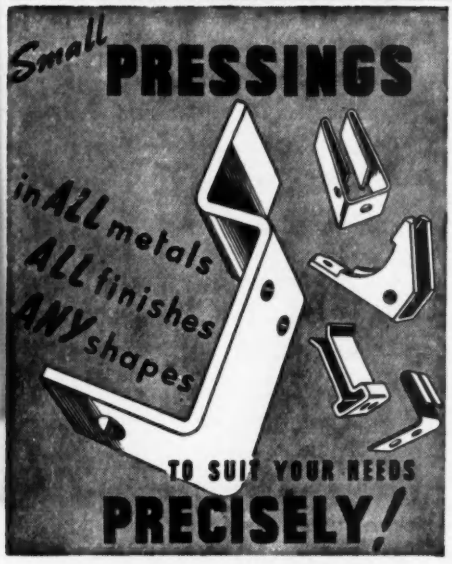
of the Electrical Contractors' Association is a privilege to those contractors who can offer skill and experience combined with a genuine desire to be of service to users of electricity.

They agree to comply with rigid standards of workmanship, and installations carried out by them are financially guaranteed by the Association.

For a safe and efficient installation place YOUR electrical work in the Safe Hands of an E.C.A. member.

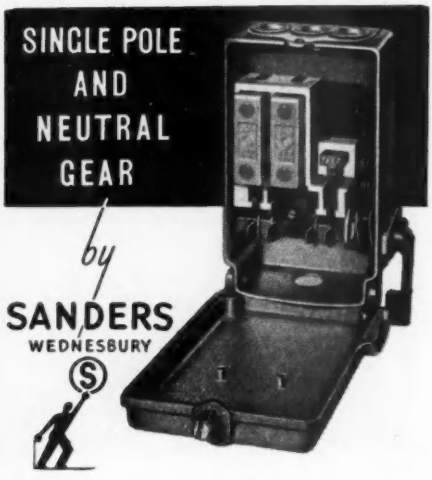
For the names and addresses of E.C.A. members in your area, write to the

ELECTRICAL CONTRACTORS ASSOCIATION (INC.)
AFRICA HOUSE, KINGSWAY, W.C.2



GEORGE WILDEN
Western Works. 170, Pitsford St.,
Birmingham, 18. (*NOR* 2714)

1440



METAL CLAD SPLITTER FOR CONDUIT ENTRY WITH TWO 15 AMP. OUTGOING FUSES
LIST NO. N401RC.

The Wheels

of production are kept turning through dependability in the windings—largely by

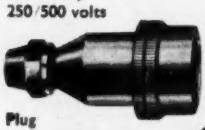
Lewcos INSULATED WIRES

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, LEYTON, E10

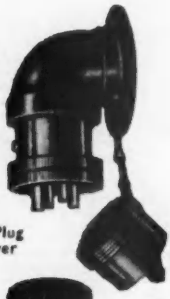
REGD. TRADE MARK
NIPHAN

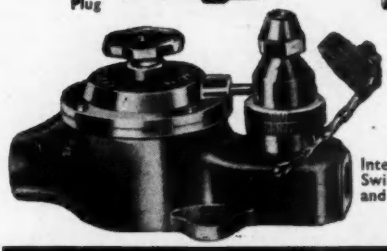
WEATHERPROOF METAL-CLAD PLUGS, SOCKETS, SWITCH PLUGS, ETC. for all electrical purposes

5/300 amp.
250/500 volts


Plug

Through Angle Socket and Cover


Flange Angle Plug and Cover


Interlocked Switch Socket with Cover and 3- or 4-pole Plug

Plain Socket

Latest Catalogue on Application

SIMMONDS & STOKES (NIPHAN) LTD
MANUFACTURING ELECTRICAL ENGINEERS
Victoria House, Southampton Row, London, W.C.1 · Holborn 8637 and 2163

OVERSEAS AGENTS: *S. AFRICA, Hubert Davies & Co., Ltd., Johannesburg. CEYLON, Walker & Greig, Ltd., Colombo. NEW ZEALAND, Samuel Brown, Ltd., Wellington. KENYA, Nairobi, British East Africa, R. W. Ketchley & Co.*

WIREOHMS, LTD
NOTTINGHAM

Makers of
ALL TYPES OF
ELECTRIC ELEMENTS

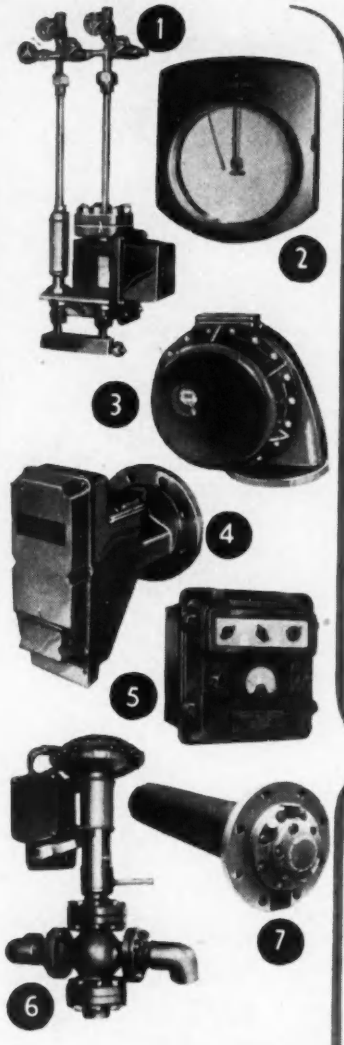
SOLE WORLD DISTRIBUTORS:
H. J. BALDWIN & CO., LTD.
Baldwin House Nottingham

FIRE!
WHERE'S YOUR
NU-SWIFT?
The World's Fastest Fire Extinguishers — for every Fire Risk
Pressure-operated by sealed CO, Charges
NU-SWIFT LTD. • ELLAND • YORKS
In Every Ship of the Royal Navy

NOT JUST— **CABLE**
V.I.R. Taped and Braided; Tough Rubber; Lead Covered and Flexibles
BUT—
CABLE OF QUALITY

WANDLESIDE CABLE WORKS LTD.
106, Garratt Lane . Wandsworth . London, S.W.18
Telephone: Battersea 2273/4
Telegrams: Wandleside, London.

WANDLE • BRITISH MADE • CABLE



EVERSHED

See the

EVERSHED "CENTROLLER"
AT THE BRITISH INSTRUMENT INDUSTRIES EXHIBITION

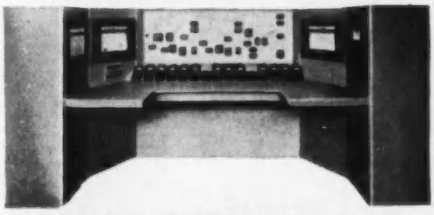
Stand No. 4—Row E
(National Hall, Olympia, July 4th—14th)

The Evershed "Centroller" concentrates in a single unit all vital data and controls for the centralised operation of plant. It comprises a console or desk on which are mounted many controllers, indicators and recorders, and usually a diagram incorporating miniature indicators at the appropriate points of measurement.

Centralised control is achieved by the Evershed Electronic System which facilitates remote indication and control of flow, levels, pressures, temperatures and other measurements.

Write for details of Evershed "Centroller" and of its various components and associated instruments, each of which can be supplied for separate operation if desired.

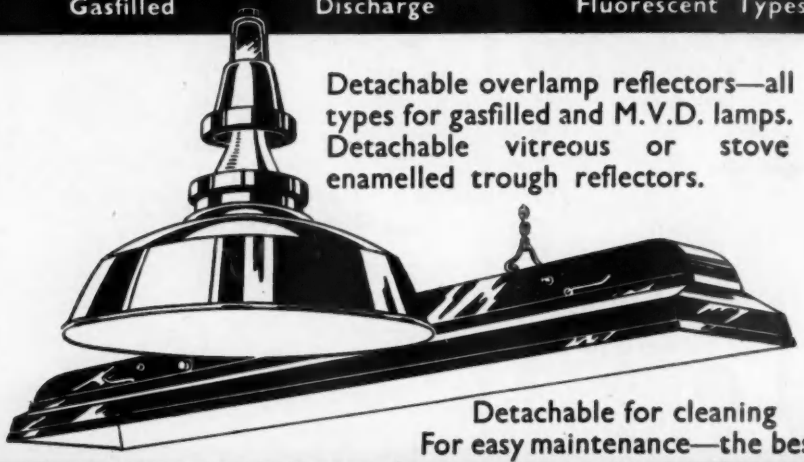
1 "Rollflow" Meter.....Publication I.P. 5
2 Circular Recording Receiver.....Publication I.P. 14
3 Precise Tank Gauge.....Publication I.P. 6
4 Tank Contents Gauge.....Publication I.P. 4
5 Process Controller.....Publication I.P. 8
6 Electro-Pneumatic Relay.....Publication I.P. 7
7 High Level Alarm Switch.....Publication I.P. 13



EVERSHED & VIGNOLES, LIMITED
ACTON LANE WORKS, CHISWICK, LONDON, W.4
Telephone: Chiswick 3670 Telegrams: Megger, Chisk, London

6/10

THORLUX INDUSTRIAL LIGHTING EQUIPMENT. Manufacturers of Gasfilled Discharge Fluorescent Types



Detachable overlamp reflectors—all types for gasfilled and M.V.D. lamps. Detachable vitreous or stove enamelled trough reflectors.

Detachable for cleaning
For easy maintenance—the best.

F. W. THORPE LTD. WELBY RD HALL GREEN **BIRMINGHAM 28**

SPRINGFIELD 3318 GRAMS: THORLUX B'HAM

NEWTON-DERBY

AUTOMATIC VOLTAGE REGULATORS

Also Makers of—

ROTARY TRANSFORMERS & ANODE CONVERTORS, WIND & ENGINE-DRIVEN AIRCRAFT GENERATORS, HIGH FREQUENCY ALTERNATORS & HIGH TENSION D.C. GENERATORS

NEWTON BROTHERS (DERBY) LTD.

ELECTRICAL PLANT SPECIALISTS

Head Office and Works: Alfreton Road, Derby. Tel.: Derby 47676 (3 lines). Grams: "Dynamo," Derby.

House Wiring Cables
SCOTTISH CABLES
RENFREW
SCOTTISH CABLES LIMITED
DEANSIDE • RENFREW • SCOTLAND
LONDON OFFICE: MANFIELD HOUSE 376/379 STRAND W.C.2
Associated Company: SCOTTISH CABLES (SOUTH AFRICA) LTD PIETERMARITZBURG, NATAL

ESTABLISHED 1840

ATTWATER & SONS

HOPWOOD STREET MILLS.
PRESTON.

MICA & MICANITE

IN ALL FORMS & QUALITIES.

BAKELITE SHEETS · TUBES · BOBBINS · VARNISH AND ROSIN
FOR OIL SWITCH GEAR & TRANSFORMERS

VULCANISED FIBRE SHEETS. TUBES AND RODS.

PEERLESS **LEATHEROID** INSULATION.

BAKELAQUE INSULATION
BEST BRITISH MANUFACTURE
BRISTLE LIVE FULL CROW
BEST TRADE MARK

Cotton and also Asbestos Dynamo Tapes.

Presspahn and Fullerboard In Sheets and Rolls.

Empire Cloth and Tapes

Ebonite and all Insulating Material for Electrical Engineers.

"THE FLUXITE QUINS" AT WORK
"This tractor's a wonder" cried EE.
"Since fixing with FLUXITE you see."
"She'll go better still"
Cried EH, "That she will
If you cast yourself loose from that tree!"

For all SOLDERING WORK—you need FLUXITE—the paste flux—with which even dirty metals are soldered and "tinned." For the jointing of lead—without solder; and the "running" of white metal bearings —without "tinning" the bearing. It is suitable for ALL METALS—excepting ALUMINIUM—and can be used with safety on ELECTRICAL and other sensitive apparatus.

With Fluxite, joints can be "wiped" successfully that are *impossible by any other method.*

Used for over 40 years in Government works and by leading Engineers and Manufacturers. OF ALL IRONMONGERS in tins—from 1/- upwards.

THE FLUXITE GUN puts FLUXITE where you want it by a simple pressure. Price 2/6 or filled 3/6.

FLUXITE

SIMPLIFIES *ALL* SOLDERING

Write for leaflets on case-hardening steel and tempering tools with FLUXITE, also on "Wiped" joints. Price 1d. each
FLUXITE LTD. (Dept. E.T.) Bermondsey St., S.E.

"A GOOD TIP!"

ELECTRICAL ACCESSORIES BY

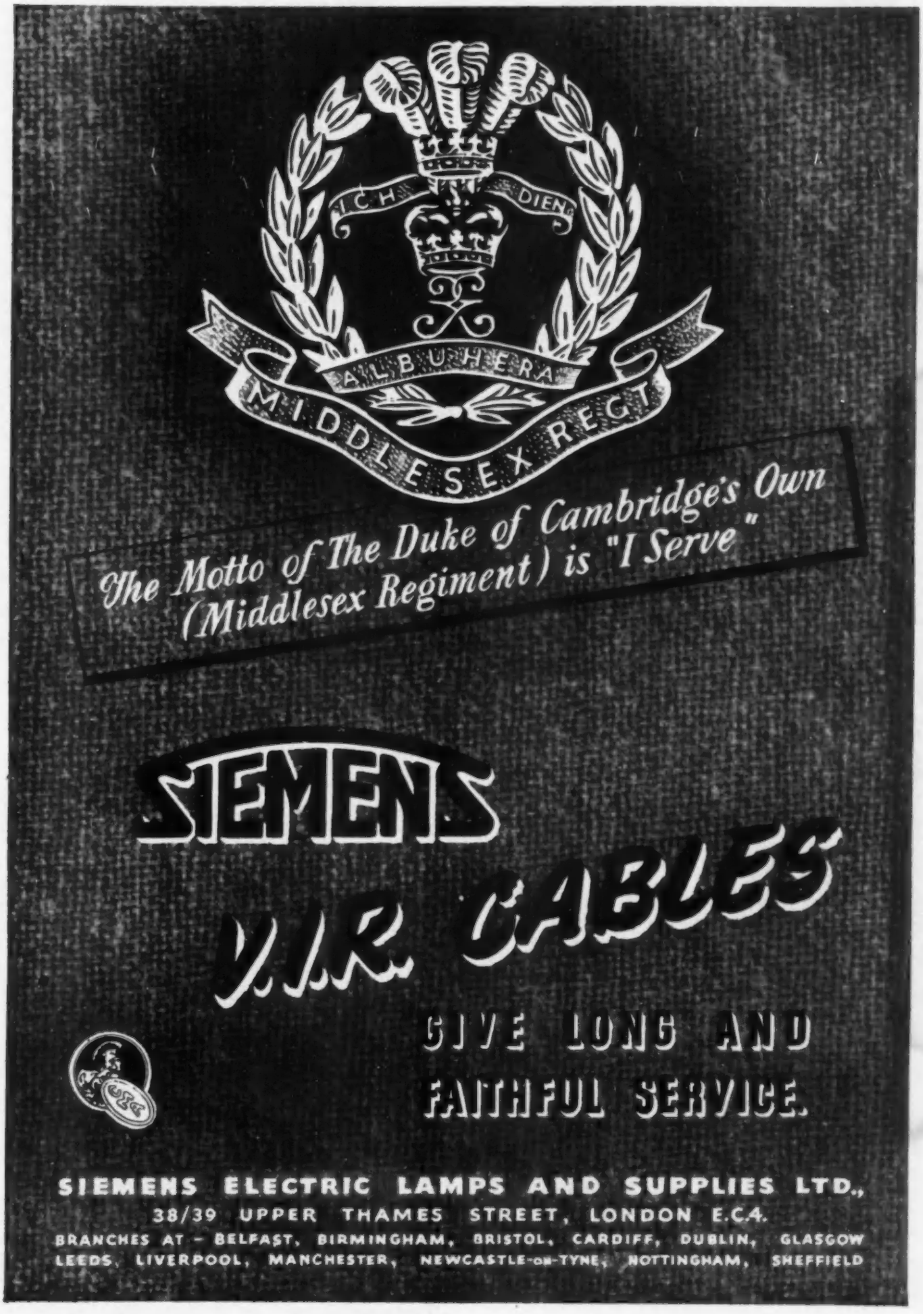
CLANG
TRADE MARK LIMITED

CROWN YARD, CRICKLEWOOD, N.W.2
Telephone: GLADSTONE 4201

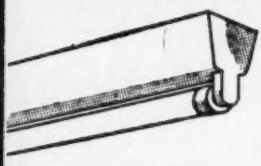
Chartex ***INSULATING MATERIALS***
Regd. Trade Mark

PAPER & FABRIC LAMINATED TUBES, FORMERS, SHEETS & MACHINED PARTS. FIBRE & EBONITE RODS, TUBES & SHEETS

W. H. GRIMMER
50, BOW LANE, CHEAPSIDE, E.C.4
WORKS ROMFORD, ESSEX
Phone: City 1791-2 Cables: Chartimer, London.

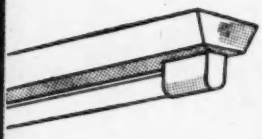

ICH DIENE
ALBUHERA
MIDDLESEX REGT
The Motto of The Duke of Cambridge's Own (Middlesex Regiment) is "I Serve"
SIEMENS
V.I.R. CABLES
GIVE LONG AND FAITHFUL SERVICE.
SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD.,
38/39 UPPER THAMES STREET, LONDON E.C.4.
BRANCHES AT - BELFAST, BIRMINGHAM, BRISTOL, CARDIFF, DUBLIN, GLASGOW
LEEDS, LIVERPOOL, MANCHESTER, NEWCASTLE-on-TYNE, NOTTINGHAM, SHEFFIELD

LOW-PRICED FLUORESCENT FITTINGS

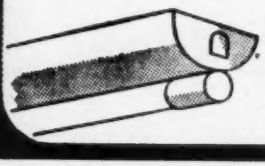


Type **DD 300**
3ft. BATTEN
Retail price—
£3.7.6

also **DD 400**
4ft. BATTEN
£3.10.0

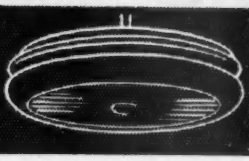


Type
DD 500
5ft. BATTEN
Retail price—
£4.12.6

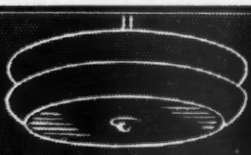


Type **18 R**
5ft. BATTEN
Retail price—
£5.15.0

"Fluoradisc" 1001 £8.5.5



DRUBEL
DISTRIBUTORS LTD.
39a Stafford Rd. Croydon, CRO 1107-8



"Fluoradisc" 1005 £12.12.0

ANNOUNCING

MODEL NO.
N.1600
for
SPEED
INFORMATION
and
3-WAY
PROTECTION
of
CASH
RECEIVED

A FOUR TOTAL RECEIPTING MACHINE

Providing 3 identical, non-carbon printed records of receipts on

1. The Customer's Account
2. The Receipt Posting Stub
3. The Locked-in Audit Record

ALL TOTALS UNDER LOCK & KEY

National

For details and demonstrations please write or phone
THE NATIONAL CASH REGISTER COMPANY LTD.
308 Marylebone Rd., London, N.W.1. Paddington 7070

For new and used machine tools . . . power presses . . . sheet metal working and woodworking machinery, etc. . . . **F. J. EDWARDS, LIMITED,** *359-61, Euston Road, London, N.W.1. Tel: Euston 4681-3771. 'Grams: Bescotools Norwest London*

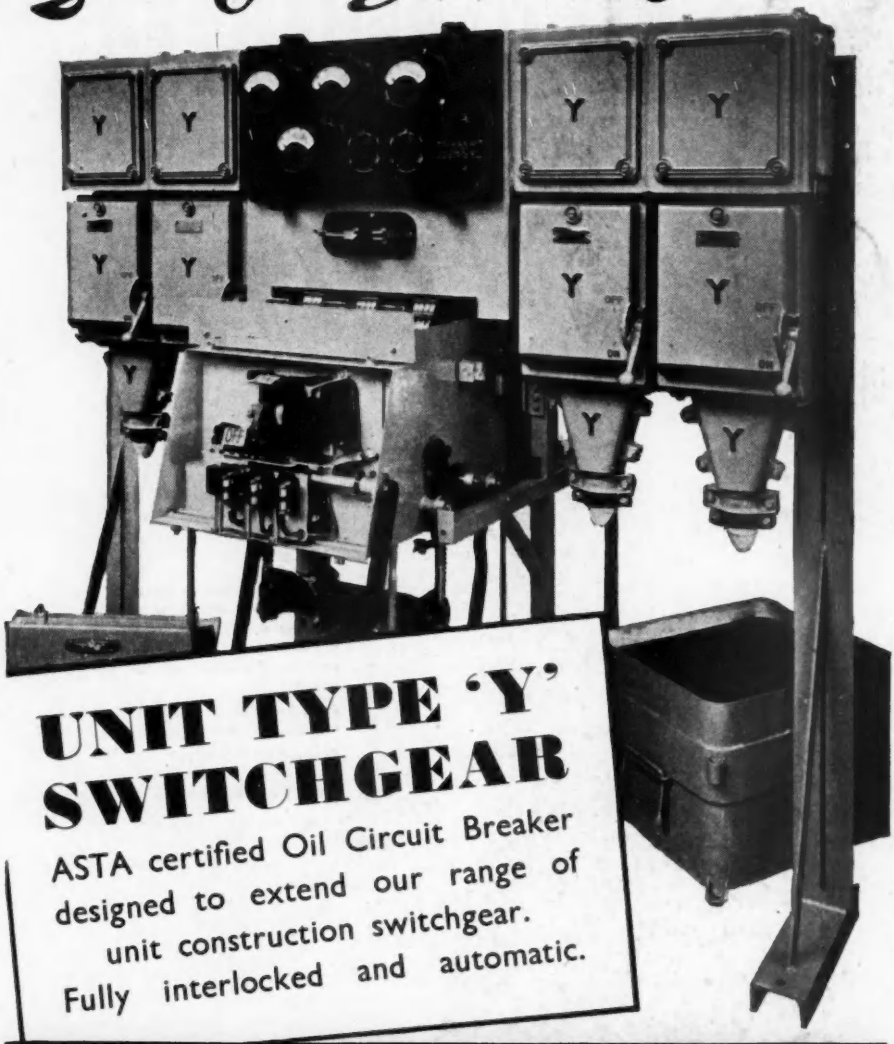
INSTRUCTION CHART
For dealing with apparent death from
ELECTRIC SHOCK
(In accordance with H.O. Electy. Reg. 29)
Mounted on strong board, varnished and corded for hanging
Price 3/- plus 10d. postage (per single copy)
ELECTRICAL TIMES
Sardinia House, Sardinia St., LONDON, W.C.2

MORE— —THAN
FIFTY YEARS
SPECIALISATION IN —
INSULATED ELECTRIC WIRES, CABLES & FLEXIBLE CORDS
The SAXONIA ELECTRICAL WIRE Co. Ltd
ROAN WORKS GREENWICH S.E.10
Phone: Greenwich 0463-1672 ◆ Grams: Saxonist London

POINTS TO REMEMBER
WHEN YOU BUY ELECTRIC MOTORS
Bearings
You buy motors to last. You want extra strength at the driving end of the shaft to take belt load . . . BROOK motors fit ROLLER BEARINGS.
A standard feature, but a worthwhile one.
Nearly fifty years of specialisation in Electric Motors from 0·25 to 200 H.P.
BROOK MOTORS LTD
HUDDERSFIELD
ENGLAND

1.HD.117

See for yourself!



UNIT TYPE 'Y' SWITCHGEAR

ASTA certified Oil Circuit Breaker designed to extend our range of unit construction switchgear. Fully interlocked and automatic.

ELECTRO MECHANICAL MANFG. CO., LTD.

Tel Scarborough 2715/6 SCARBOROUGH, YORKS Grams EMMCO SCARBOROUGH

London Office and Showroom: Grand Buildings, Trafalgar Sq., W.C.2. Phone: Whitehall 3530 Grams: Tramsuplim Rand
Associated with Yorkshire Switchgear and Engineering Company Limited, Leeds 6

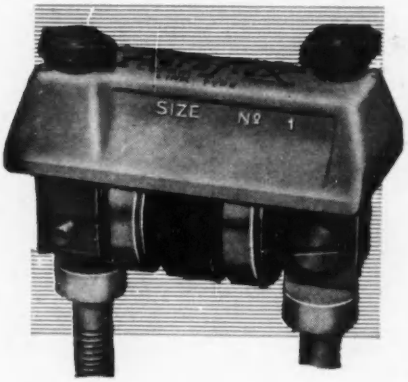
Printed in England for the Proprietors, THE ELECTRICAL TIMES, LTD., by SUN PRINTERS, LTD., London and Watford, Herts, and published at Sardinia House, Sardinia Street, London W.C.2. July 5, 1951

LINK TYPE FUSE UNITS

With Aeroflex Ceram HOPE'S PATENTS

60 *to* 800 *AMPS.* 25 *M.V.A. BREAKING CAPACITY*

Rewireable Cartridge Fuse Links



In substations, distribution pillars and sealed service boxes, among other applications where fully shrouded distribution is not required, Aeroflex Ceram Link Type Fuse Units afford a simple method of utilising the new compact Aeroflex Ceram Rewireable Fuses.

Interchangeable with other makes, these cartridges retain the essential Aeroflex characteristics of proved high breaking capacity, low temperature rise and fusing factor with time lag at moderate overloads, and are non-ageing.

Full details of Aeroflex-Ceram Link Type Fuse Units are given in List LU/1

Captive bolts are employed having partly reduced shanks and the cartridge may be withdrawn without displacing any loose parts. Screwing the moulded knobs on the fuse handle forces down a wedge contact against the fuse blades thus affording perfect electrical continuity.

PARMITER HOPE AND SUGDEN LTD.
FLUVENT ELECTRICAL WORKS, LONGSIGHT, MANCHESTER 12
London Office: 34 *Victoria Street, S.W.*1
Glasgow Office: 162 *Buchanan Street, C.*1

Why did Big Motor Works say Mazda?

NEW LIGHTING SYSTEM CAN HALVE INSTALLATION COSTS

FOR their new works at Luton, Vauxhall Motors Ltd. adopted Mazda Universal Trunking. This new lighting system is based on lengths of extruded aluminium section, formed to carry all the wiring, to simplify suspension, and to allow reflectors and auxiliary gear to be sited wherever required. The advantages, both electrical and mechanical, are little short of revolutionary, and the system is so simple that it can *halve* the cost of a large industrial lighting installation.

The same research facilities and engineering skill that went into Mazda Universal Trunking are behind all Mazda Lighting Equipment; and the BTH Lighting Advisory Service, staffed by some of the country's foremost lighting engineers, is available without charge or obligation through any BTH office.

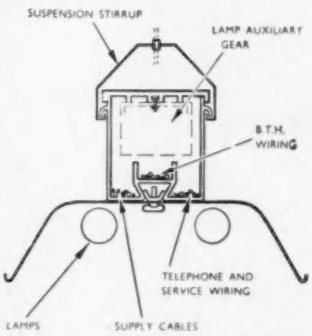
For sound lighting engineering

say Mazda!

THE BRITISH THOMSON-HOUSTON CO. LTD.
Crown House, Aldwych, London, W.C.2
Member of the A.E.I. Group of Companies

MAZDA UNIVERSAL TRUNKING

THE NEW VAUXHALL FACTORY BY NIGHT. Total floor area 850,000 sq ft. Not only lighting, but many other services are also carried in the trunking.



Transverse section of the trunking. Auxiliary gear secured to lid by T-slot. Suspension stirrups and reflectors attached to continuous formed section. Note separate ducts for lamp wiring and cables for mains supp.y and other services: all kinds of wiring up to small power gauge can easily be run through the trunking. M4328